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a magazine for Shooters by Shooters

Precision SHOOTING

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COVER PHOTO

YOUNG SHOOTERS IN THE MAKING: Weathering 6 days in the 50 point Pellgun Range with Crosman Model 160 Training Rifles, students, army staff coaches and Crosman representatives experienced temperatures of 40 degrees, winds up to 45 MPH and constant rain, at Camp Perry, 1964. This did not prevent the hardy boys and girls from turning in scores in the upper 80's and 90's with trying conditions. This annual program draws boys and girls from all parts of the United States to earn their shooting medals and Crosman awards at the National Championship Matches in Camp Perry, Ohio.

IN MEMORIAM

By Betty Summerall Duncan

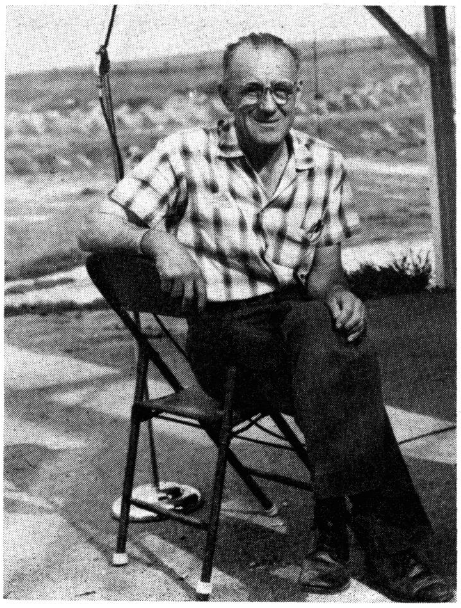
***

Those of us who witnessed the valiant struggle, which **Henry C. Wright** waged against cancer, were filled with admiration. For three years after his last surgery, he refused to give up, defying all medical prognosis. The famous gunsmith was in his shop regularly during this period up until the last day of his life. Finally, on November 6, 1964, in his big chair in the living room, Hank, like the old soldier, quietly "faded away" . . .

At the age of 64, he had carved his niche in shooting history. Entering his first competition in 1925, he went on to win the 1927 200-yd. Smallbore Any Sight Match at Camp Perry, the 200-yd. Match in 1928, and placed second in the National Smallbore Championship that year. A member of the Calif. State High Power Team in 1927, 1928, and 1929, he was high Civilian in the 1928 Wimbledon with a perfect 100 X 100. His string of laurels—championships and records—continued to accumulate for nearly 40 years.

Henry and Freda were pioneers of International-type shooting in California. It has been through their efforts that the Fresno Rifle & Pistol Club has sponsored such outstanding International-type events.

About 1935, gunsmithing for Hank Wright ceased being a hobby and became a serious business. This developed through the improvements which he was constantly making to his own equipment, utilizing his inventive genius and machinist's background. Collaborating with the late Mike Allen, they produced the well-known Wright-Allen trigger for Winchester 52, Remington 37, and Springfield 03. This trigger was designed to eliminate all forward and after creep in trigger let-off with the ratio of leverage eliminating perceptible backlash . . . From their partnership also came the very accurate Wright-Allen receiver sight, and a compact scope stand with legs which folded into a 2" X 12" tube, requiring a minimum of space in the shooting kit and having great strength.



HENRY WRIGHT
(1962 photo)

Henry's latest triggers were made for the USMC Int'l Team, just prior to the 1962 World Championships. This was a double set trigger, which is set by pushing forward on the front trigger. The hair trigger is the rear trigger and can be adjusted "so light that you can blow it off."

Avid readers of **Precision Shooting**, Freda wrote me, "We always read your column aloud and Henry so enjoyed it, and would nod his head when he agreed."

Always the perfectionist, Henry did not hesitate to mar his own beautiful stock if necessary to improve the fit. He showed me a picture some years ago, which someone snapped as he was whittling on the comb in the middle of a match.

His rifles will continue to achieve fame, as will the equipment which he has made—a lasting memorial to Henry C. Wright.

TOURNAMENT CIRCUIT

SMALLBORE AT FRESNO, CALIFORNIA

Victor Auer, Sherman Oaks, Calif., nosed out Robert Perkins of Fresno, by a 3x margin to win the two-day prone smallbore aggregate at the Fresno Rifle and Pistol Club's Mid-Winter Tournament, December 5th and 6th. Auer scored 3193-256x to Perkins' 3193-253x. With metallic sights on Saturday, Perkins scored 1594 to Auer's 1593, but Auer shot a possible 1600 with any sights on Sunday to beat Perkins' 1599 and even the point score.

Michael Allen, Beverly Hills, was third in the grand aggregate with 3192, and followed by Cliff Pierson 3190, Robert Boydston 3189, Forrest Kline 3186, Henry Benson 3185, Judith Saffall 3184. High Experts, Marilee Reich 3183 and Kenneth Hayes 3181.

Marilee Reich was third high overall in the any-sight aggregate with 1597.

BROOKLYN, NEW YORK

A field of 47 fired the Metropolitan Rifle League's Double Individual Match at the II Corps Avenue in Brooklyn on December 20th. The course of fire was two 40 shot matches at 100 yards, indoors, with any sights for an 800 point aggregate possible.

The five high in the first match were J. Maher 400-34x, A. Rosenblatt 400-34x, I. Tekulsky 400-32x, L. Moore 400-32x, and M. Alvis 400-31x. Also firing 400 possible scores were F. Triggs, W. Heil, E. Hager, Jr., E. Clausen, and W. Tomsen. Ellen Glaab shot a 399-33x score.

Five high in the second match were L. Moore 400-33x, M. Coughlin 400-32x, S. Tekulsky 400-32x, A. Marino 400-32x, and F. Triggs 400-31x. Others shooting 400 possible scores were I. Tekulsky, G. Tomsen, Ellen Glaab, R. Alvis, H. Stowell, E. Hager, Jr., and R. Truesdell.

Shooting 800 possible aggregate scores were L. Moore 800-65x, I. Tekulsky 800-63x, F. Triggs 800-61x, and E. Hager, Jr. 800-53x. A. Rosenblatt had the high X-count with his 799-69X.

SELECTING SHOOTING TEAMS FOR THE SEVENTH MACCABIAH GAMES

These will be held from August 23 through 31, 1965, in Israel and plans are being made by United States Maccabiah Games Committee to field a squad of approximately 15 shooters from the United States. The team is expected to depart from New York about August 21 and return around September 3.

A small shooting squad from the United States competed in these Games the last time they were held, in 1961. United States shooters won gold medals in four events, silver medals in two matches and bronze medals for third places in two matches.

The matches are patterned closely after those in the Olympic Games and ISU World Championships. All shooting is governed by ISU rules. Events to be fired in 1965 consist of the smallbore rifle 60 shot prone match, the three position smallbore rifle match, the free pistol slow fire match at 50 meters and the International Clay Pigeon event. Both individual and team competition is scheduled.

Team membership is open to anyone, male or female, of Jewish faith. All those who wish to be kept informed of team selection plans and of other details of these Games should immediately contact one of the following: For rifle and pistol, contact Michael J. Morse, 9250 S. W. 70 Avenue, Kendall, Florida; for International Clay Pigeon, contact R. Willstatter, 54 Brewster Road, Scarsdale, New York.

Random Shots

By Betty Summerall Duncan

"GARY ANDERSON DAY" was proclaimed by Hastings, Nebraska, on the date of the Olympic star's return from Tokyo!!! Close to 10,000 people shouted a tumultuous welcome, climaxed by the largest parade in the history of the small college town where Gary is a student—a tremendous reception for the 300-meter gold medalist . . . . I would venture to say that it was the largest parade ever held in the U. S. honoring a shooter—if not the only such parade!

The prestige of the shooting game is at an all-time high following the XVIII Olympic Games. If we are smart, we will capitalize on it, before the public forgets the noble image created on the ranges of Asaka. Follow Fred Hallberg's advice and "become more public-relations minded." Fred certainly had the right idea in his article in the October P. S. Let's not waste his suggestions; put them to use! Have a dinner—invite public officials—give them an opportunity to hear our viewpoint, ask questions, and learn the facts.

See the inaccurate propaganda articles in the December 28th issue of **Newsweek** and a recent **Harper's** and you won't have to have it spelled out for you. We must be prepared for an imminent onslaught of attempted anti-gun legislation. Under an NRA advertisement, **Newsweek** has captioned: "National Rifle Association ad: Come on in, the ammo's free!" . . . I've been a Life Member of NRA for 14 years and I have yet to receive my first round of free ammo . . .

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Western Wildcats, perpetuators of the

Los Angeles Rifle & Revolver Club postal team, which unofficially defeated the Yorkshire, England, Club. (left to right) Larry Anderson, Mike Allen, Capt. Pres Kendall (Official Observer), Bill Grater, Judy Saffell, Vic Auer, Betty Duncan, Ed Takahashi, Elinor Bell, Bill Halsted, and Louis Rogers. (Note: Allen, Kendall, Grater, and Auer, fired at Bisley in 1963 as members of the NRA International Prone Team.)

ENTER NOW!
49th AMERICAN SMALLBORE RECORD POSTAL MATCHES
Individual—Team
Senior Match—100 shots offhand
College Match—50 shots offhand
Junior Match—20 shots each prone—offhand
Sub Jr. Match (under 14) 50 shots prone
December to April
Entry blanks—Blue Trail Range
316 N. Branford Rd.,
E. Wallingford, Conn.

6400-point smallbore prone aggregate, are looking forward to their annual 4-day shooting-fest February 25-28 in Phoenix. George and Grace Stidworthy are going all out to make this the best Wildcat tournament yet.

The Stidworthy Awards System has added greatly to the popularity of the Wildcats' matches. In keeping with the policy of giving the shooters what they want, they are offered a choice of cash, merchandise, or trophy awards. Several clubs have requested the awards chart and, according to Mike Morse, it will definitely be used by the Palmetto (Fla.) Club at their **Sawgrass** tournament March 4-7.

Wildcats Challenge Eastern Smallbore Shooters!!! "Western shooters have always felt that they faced a definite disadvantage each year in seeking the National Championship. They have faced the problem of the extra time, travel and expense involved, plus the fact that Camp Perry conditions are usually quite 'foreign' to those encountered on Western ranges. To prove their faith in their shooting abilities in their own domain, the Western Wildcats issue this challenge to any bona fide Eastern (east of the Mississippi) civilian Club or State Association . . . If the scores in the Grand Aggregate of your top four shooters exceed those of the top four Wildcats, we will refund the entry fees of those four shooters in addition to whatever awards they have won."

Let me remind you of the chartered flight which is being planned by Mike Morse, 9250 S. W. 70th Ave., Kendall, Florida, from the East Coast to Phoenix and return. It is my understanding that Mike is considering an appropriate reduction, for shooters boarding in Newark and Kansas City, **under** the price quoted from Miami.

* * *

Looking over the various tournament dates and noting that Freda Wright is going ahead with the Internationals in Fresno on February 20-21, I can't help admiring her courage. She is carrying on just as Henry would want her to. They have been cooperative in scheduling their shoot for the week-end before the Wildcats Matches so that Int'l shooters could attend both.

Freda also went through with the **Fresno Mid-Winter Smallbore Tournament** on December 5-6. What was it that someone said to the effect that "To the Victor Belong the Spoils"? If the spoils are synonymous with the Grand Aggregate, then Victor really scooped them up—**Victor Auer,** that is. Vic has always been lucky on that range, where many people aren't. Since 1956, he hasn't lost a tournament there, out of 7 tournaments. This time he really had to work to get a 3X lead over **Bob Perkins . . . .**

Conditions were beautiful—quite unusual for the Fresno range. During the matches, ducks could be seen flying overhead in V-formation. Our good friend, **Mike Allen,** of Beverly Hills, took the Metallic Aggregate with 1595-106X, trailed by Bob Perkins, scoring 1594-117X, Bob Boydston with a 1594 (the X-count escapes us), and Auer with 1593-118X. After shooting a 399-35X in the 100-yd. iron, Vic discovered the 3-click backlash in his rear sight.

Last May, Perkins fired the first 1600 ever fired on his home range. At this tournament, Vic's 1600-138X was the second possible and good enough to break his own National Reserve Record. Perkins was leading until the last match, the 100-yd., where he dropped a point, but still led until Vic fired a 19X possible on the last stage. They finished up 3193-256X to 3193-253X. Vic had a 38X at 50-meters, a 37X at 50-yds., 34Xs at 100-yds., and 29Xs in the Dewar.

* * *

We have discovered how Bob Perkins overcame the problems which he was having with his vision. He uses the Barrett disc with a correction, which we knew. What we did not know was that, in addition to his regular prescription, he has it increased ½ diopter, which give him approximately the equivalent of 20/20 vision. Henry Wright suggested it to him, after which he visited several doctors, and was finally convinced that it was the solution to his problem.

Along these same lines, many people would like to see the **Hensoldt Diopter** legalized. Really, if anyone objects to allowing shooters who have reached their 70th birthday to use a diopter, then the dissenter is not concerned with the best interests of the shooting game! Many feel that even a more lenient provision should be adopted permitting those under 70, who have (medical) **proof** that their eyesight is poor, to use the diopter. Random Shots has previously urged a favorable ruling on the use of the diopter. If a polite request is ineffective, then we may have to resort to stronger measures.

* * *

Meanwhile, Oregon shooters are planning a 3200 **all-scope** tournament on the McKenzie Bridge range this summer! Stand by for dates.

* * *

On October 18th, the **Los Angeles Rifle & Revolver Club** fired its second annual smallbore prone postal match with our friends across the Atlantic, the **Yorkshire Rifle Club,** of Yorkshire, England. Conditions were a bit quarrelsome that day and no possibles were fired. We tried a new system of combining our record firing with the tryout. Unofficially, our 3979-254X on the U. S. targets was the high score. The course of fire was the Dewar, metallic sights. This friendly, transoceanic, rivalry is an excellent thing, and definitely should be encouraged. It seems more advantageous to us, however, to use the British target in the future.

Winning team members, in order of rank, are as follows: Vic Auer—399-28X; Judy Saffell—399-28X; Larry Anderson (19-years-old)—399-25X; Ed Takahashi—399-24X; Bill Grater—398-31X; Mike Allen—398-28X; Bill Halsted—397-27X; Elinor Bell—397-20X; Betty Duncan—397-17X; Louis Rogers—396-26X.

Three members of the team, Auer, Grater, and Allen had a special interest in the competition, having fired at Bisley in 1963 as members of the NRA Int'l Prone Team. Their teammate, Capt. Pres Kendall, USA, who was our guest, served as "Official Observer" for the postal team firing. (His presence also served as an incentive for me to leave the typewriter and get my rifle out of mothballs.)

* * *

As I stress from time to time, Random Shots is **your** outlet. In my recent mail was an interesting letter from the secretary of one of the state associations. In concluding, he queried, ". . . But, NRA, have you given much thought to the Director elections, or their policy re letters to the Editor? Both are very much closed shop."

Mr. Secretary, this is a particularly timely subject. To answer your question, I have given a great deal of thought to the matter of NRA Director elections. On the topic of letters to the Editor, I am a greenhorn. I should, however, have written that gentleman a letter a few months ago about an article which he printed on a so-called **safety** range, with which I am quite familiar. Not only is it not a safe range, but it is probably the **most unsafe** range in the country. Even the number of firing points was exaggerated so that we would never have recognized it as being the range described in such glowing terms, even though there was a picture, had it not been mentioned by name. Then, it vividly recalled the occasions when my own life has been endangered by practices on their "super safety range"!

As for the method of "electing" (if we may use the term loosely) the NRA Board of Directors, I know of no one who is happy with the system except the Directors themselves, unless it should be our inactive members—such as some of the hunters, who are far removed from the business of the Association and don't know any of the people, anyway. Included in my stack of correspondence on the subject is a file which contains the "Supplementary Report of the NRA Bylaws and Charter Committee," dated August 24-25, 1956 (and carefully hidden away ever since). Before I discuss its contents, I noted erroneous information in the 5th paragraph, stating, "In 1953, 1954, and 1955, the election of Directors has been carried out as provided,

(Continued on Page Twelve)

INTERNAL BALLISTICS — II

By Edward M. Yard

Experimental Ballistics Associates

The previous installment on this subject dealt particularly with Newton's Laws of Motion. In addition to what we covered before, he also states that action is equal to reaction. The same force that accelerates a bullet from your gun barrel, causes recoil. The momentum of gun and bullet are nearly equal. Some jet effect after the bullet leaves the muzzle affects the exact balance. It must be noted in a study of Newtonian mechanics that momentum is conserved. If you think with anticipation of the thumping the game will get from your bullet, remember you'll take the same. This point has been often mentioned. Warren Page in "Knock Down Nothing," '62 Gun Digest goes into this very well. But perhaps you have not understood that if your bullet would knock a deer weighing 150 pounds flat, your gun is going to dump you (weighing 150 Lb.—*?!) too!

Energy is a different thing indeed. Never confuse energy with momentum. The latter takes some stopping, but the former is work. The bullet has the energy, though both gun and bullet have about equal momentum. All of us can stop the gun, but the bullet is another matter. Those who wish to talk momentum and killing power may do so. Better first get a grip on the elementary physics we've been talking about.

RECOIL

A TOTALLY Irresistible force, recoil, drives your gun straight back at you every time you fire. A .30-06 load rated as 50,000 P. s. i. exerts a force of 3500 pounds against you. It lasts for a very short time and the gun moves a small fraction of an inch before it is all over. Only because the gun you shoot weighs 50,000 grains, or more, are you saved from the inevitable consequence of mechanics and physics wreaking havoc upon you. Note that:

$$(6) \qquad \text{Momemtum} = mv$$

$$(7) \qquad \text{Energy} = \tfrac{1}{2}mv^2$$

Perhaps your math savvy doesn't give these meaning. Simply, a heavy gun with the same momentum as its bullet, has a low recoil velocity, and its energy will be low compared to that of the pellet with its high velocity. No matter what they say, always stop the gun and not the slug.

Sectional Density In Internal Ballistics

IN External ballistics work the sectional density of the bullet is important in figuring remaining velocity, etc. That it is just as important to what happens inside the gun may not be so well known. Yet it is one of the controlling factors of every load. S. D. (sectional density) is the weight of the bullet divided by cross sectional area of the barrel or the bullet base, where it is cylindrical. Using the weight in pounds and the area in square inches, S. D. will be in pounds per square inch. Note that these are the same units as pressure, and the meaning is the same. S. D. is the major component of the bullet's resistance, or counter pressure, to the powder pressure driving it. Hence it is a measure of the difficulty of accelerating any bullet.

A 200 grain .30 caliber bullet will be twice as hard to bring up to a velocity in a given time or distance as would a 100 grainer otherwise the same. In fact it should take twice the mean pressure. It is, of course, the mass of each bullet that determines the force needed to accelerate it, and since S. D. is exactly proportional to mass density per unit area and is a more convenient figure to use, we are comparing bullets with S. D. The factor of proportionality between mass units and S. D. is 32.2 or g.

Dividing Pressure by Sectional Density thus gives the g's of acceleration that that P. s. i. will exert on that bullet:

$P/S.D. = n$, where n is in g's

So: $a = ng$

Acceleration may be calculated by:

(9) $a = g(P/S.D.)$ ft. per sec. per sec.

for any bullet of any caliber.

From the last installment:

(3) $V = at$

So by substitution of (9) in (3) we have:

(10) $V = g(P/S.D.)t$

These then are the factors that control the internal ballistics of any load. This equation is based upon the fundamentals of mechanics, physics and mathematics. To my knowledge this relation has not been pointed out before. It was derived, and is introduced here, to clarify the internal ballistic problem.

In (10) velocity is linear in **Pressure** and time. Putting a necessary practical limit upon chamber pressure puts a limit on velocity. Time can be extended by increasing barrel length. P, since it is the average value, may be raised safely in some loads by using larger charges of slower powders. Because pressure is the result of burning powder in a gun, we should examine how.

Pressure may be varied, and not only by choice of the type of propellant in a load. Quantity of charge is the most important variable. When the amount of powder of any type is increased, other factors remaining the same, more gas is generated per unit time, pressure rises faster, reaches higher average and peak values, and the average is applied to the bullet longer. The result, in practical examples, is higher bullet velocity. There is nothing either new, or really informative in telling you that increasing your powder weight will get you more velocity. This has been said simply to bring certain facts in mind to focus, and here: that more bullet velocity (energy) **requires** that more powder energy be available **and** effectively used. There are several ways of doing this.

We tend to think of things as statics because dynamics is mathematically difficult, and careful exposition is needed to discuss variables without the math. Keep in mind that some powders have higher heat release than others, that they vary in burning rate, and that this rate varies drastically with pressure. The interaction of these factors is complex.

Increasing a powder charge, we've seen, effects a change in burning rate by two means: First a greater quantity burning releases energy faster (than would a smaller amount), next pressure now rises faster, increasing burning rate more rapidly. This is the same result that a higher energy powder having the same speed would get with a smaller charge, or that slower ones in even bigger amount often give. The Du Pont Handloaders Guide gives loads for a 180 grain bullet in the .30-06. Five of their IMR Nos. that vary in relative quickness 35%, yet all give velocities from 2525 to 2685 F. p. s. with very close to the same peak pressure of 50,000 P. s. i. Herculese HiVel 2 is a higher energy powder. It gives the same velocities with smaller charges, will equal the top one at 50,000 P. s. i.

Because the three things which regulate the rate at which energy is released in a gun are: powder characteristic, quantity, and pressure, noting that Sectional Density is pressure, the two main factors that control the choice of powder type for a load are the other two. The Sectional Density of the bullet and the quantity of propellant to be used determine the powder characteristic to use. In using these for this choice it is convenient to put dimension back in the picture (since we removed it by unitizing S. D.). Using the ratio of charge weight to bullet weight does this.

The bullet thus becomes the pivot point in deciding propellant and how much. Rightly so, as it is what will have the final energy, determines the real requirement. Its sectional density and its weight are the criteria. The fraction of its weight needed in the load of powder is controlled by the velocity expected. The powder characteristic is set by both sectional density and amount of charge. The burning rate of the powder must decrease as the product of these two factors increases. That this is not sharply critical has been demonstrated. Other factors, too, have their effects upon pressure in guns, and may influence both powder and quantity. This should be understood.

Figure 1 shows in four graphical charts the relation of these elements. In A the relative distance a bullet of sectional density .2 Lbs./Sq. In. may travel by the time peak pressure is reached compared to one of .1 Lbs./Sq. In. is shown. In B the pressure that might result for each of these is indicated. C plots the pressure versus travel for the .2 Lbs./Sq. In. bullet with powders of three characteristics. In D is shown the relations of sectional density, bore area, bullet weight and charge weight. The charts may be clearer for some than the mathematical formulae.

Efficiency And Burning Rate

This might sound like a plunge off the deep end. It may be, too, but not into what you might think. Load efficiency may help to identify relative powder burning rates.

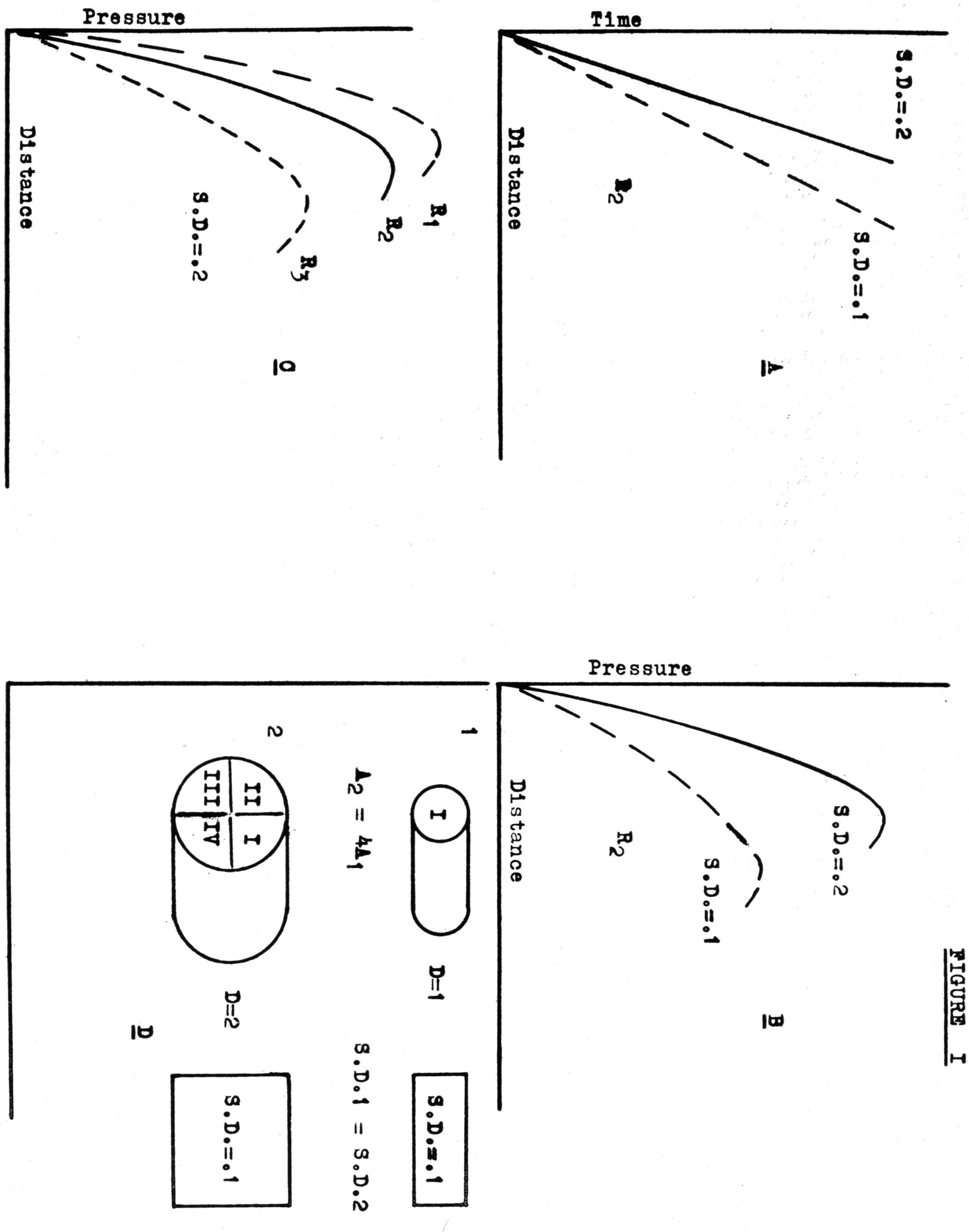
Scales of powder quickness are available. How to apply them is another matter. In the case of a strange powder there are no sources of data. Should we know or be able to obtain the heat release of the sample in relation to others, there is a way to relate it. It requires access to laboratory equipment and careful technique.

If we fire a series of loads of all probably suitable powders with a single bullet lot, a tabulation of velocity or energy for each charge will result, and from it efficiency figured. With some insight gained from our previous study, it is possible to judge burning rates at least approximately from these efficiencies. For the same velocity, a lower efficiency will mean a lower burning rate, often will show that the charge did not burn completely (energy cannot disappear).

Older theory holds that most powder loads are fully consumed in a fraction of barrel length. We doubt that this is so. There is sound experimental evidence to show just how much unburned powder there is in many loads. From this a formula has been derived for estimating the amount that may not be burned. A future one of this series will bring more on this, and powder burning theories in general.

NEW WE THINK is the identification of Sectional Density as a pressure unit, and introducing it in functions of pressure and acceleration. Also explaining the connection of ratio of charge to bullet weight to pressure, energy and acceleration is a first here, even though it has been a basic entry to Powley's Computer, but unexplained. As we indicated in the last paragraph, there'll be more about powder coming: about its geometry, rate functions, comparative energy, comments on means of testing, as much as we think in our unendowed, unsubsidized world can be probably used and checked. This is intended to be a joint educational series, meant to tax your brain and mine. We're being as minimally technical as possible while still giving adequate explanation (and letting the calculus boys see that we haven't simply by-passed it). There'll be stuff we never heard before in sections on the way.

FIGURE I


Time
Distance
S.D.=.2
S.D.=.1
R2
A
Pressure
Distance
S.D.=.2
S.D.=.1
R2
B
Pressure
Distance
R1
R2
R3
S.D.=.2
C
1
2
I
II
III
IV
A2 = 4A1
D=1
D=2
S.D.=.1
S.D.=.1
S.D.1 = S.D.2
D

ITCC COUNTER CHRONOGRAPHS

By Edward M. Yard

A CHRONOGRAPH is essential for any serious experimental handloader. There is little use putting in time to work up loads and not to know what they do. We target our ammo for accuracy, and are careful to observe pressure signs. Just as important is testing for bullet velocity. This determines muzzle energy, and that is the basic indicator of gun effectiveness.

COUNTER Chronographs with crystal oscillator controlled time bases are the only type to consider today. Their accuracy is beyond the point of debate, adequate for any amateur project. Other types, used in the past, and some of them excellent in their time, are horse and buggy to the readily purchased modern chronographs. Benjamin Robin's pendulumn was basic, is still the surest useable cheap device, but tedious and so at the price of my time is out of the question. Rotary schemes are worse, accuracy and calibration being essentially beyond amateur means or capability. The condenser charge or discharge circuits aren't in the running with the counters.

ITCC makes two solid state battery operated chronographs of the crystal oscillator controlled counter type with excellent accuracy and ample reliability. These are happily priced near the $100 mark, and just the ticket for any price minded experimenter. These ITCC instruments will hold their own with any competition, the nice price is a bonus not a come down.

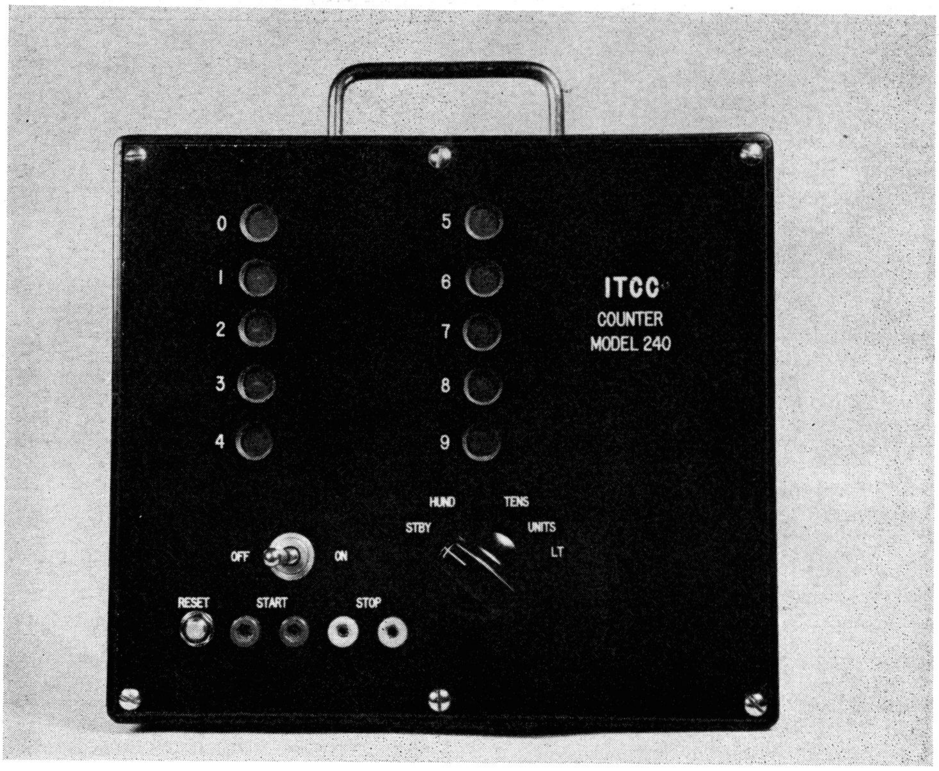
Model 240, costing $129. (plus postage) has direct decimal read-out, but only one number display. This means that after firing a test shot, a switch is used to move the indicator lights to each digit (ones, tens, hundreds). Readings are not erased by switching, and until the instrument is reset, you may turn back and forth as often as needed to get your reading. The accuracy and stability of this unit are excellent.

Model 245, costing $99.75 (plus postage), has binary code read-out to three digits that is easy to use. For any but scatter-brains the display scheme is better than the single digit direct decimal system of the Model 240. Readings are fixed until screens are replaced or other circuit change happens. The accuracy and reliability of the Model 245 are the same as for the 240, equal to any comparable chronographs and much more than adequate for the purpose, better than one tenth of one percent (1/10th %).

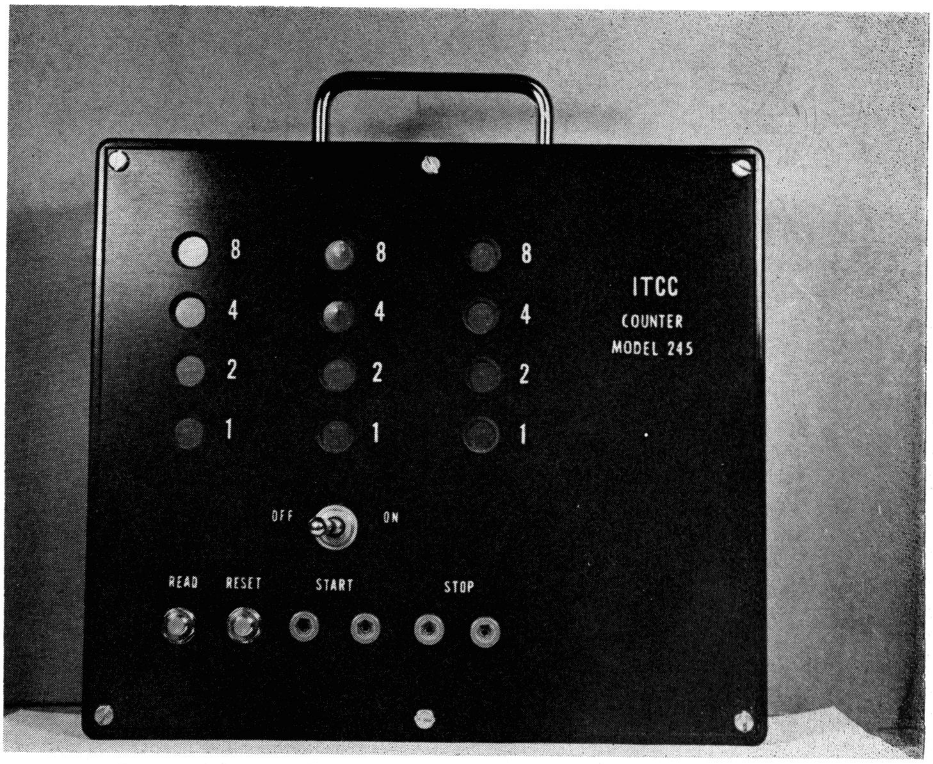
What we say about these instruments is based upon a 35 year experience in using equipment of this type in many circumstances, and under most conditions. Counter chronographs will function in snow storms and down-pours. We've run them in both, and only the counter type will take it. When the snow comes down and you run 45 test shots through in just one hour without any help, and you're glad to get out of there, you'll appreciate the sureness and accuracy of the counters.

For our own use, we think the ITCC Model 245 is the best buy. The instant three digit display is a convenience (IT IS in binary code for sure, but these days that's for granted). No comparable unit will compete in price at equal reliability.

Herter offers a unit in the same price range. It has as good or better specs, but is not as reliable. Every user we've talked to says that hot weather or continued use will induce malfunctions. In testing here during summer months but moderate heat, the Herter, if left on, gave us false readings. Unless this tendency has been corrected the ITCC chronographs should be preferred.



ITCC MODEL 240 Counter Chronograph, having a single digit decimal register that is switched for each reading, first to HUND (100's), TENS, lastly to UNITS. Reading is not erased by switching, may be re-read as often as desired until counters are re-set.



ITCC MODEL 245 Counter Chronograph with binary code read-out. Sum of the lighted 1, 2, 4, 8 digits in a column is the number reading. To cause lights to glow for a reading, press READ button. Care is needed at first to avoid pushing RESET that is next to it, erasing reading. This is a best buy chronograph.

In using any chronograph the space between screens is important. The holders should be of a type that can keep position for any muzzle blast. Screens must maintain a uniform distance. It is wise to check screen spacing with an accurate steel tape EVERY time you test regardless of rigid mounts, fixed drilled holes, etc. It is possible, even so, to have measureable variations in how screens space if taken down and re-assembled.

ITCC provides quite adequate screen holders and an excellent printed conducting screen with paper backing. It is possible to use these at fair economy. Note that with the poles supplied to hold the screen holders, a rigid spacer is needed, and would be hard to adjust to close accuracy for length. Using their screen for the muzzle break requires a large distance from the gun muzzle; otherwise gas blast from the gun will break or buffet the paper screen.

We still feel sure that substituting a

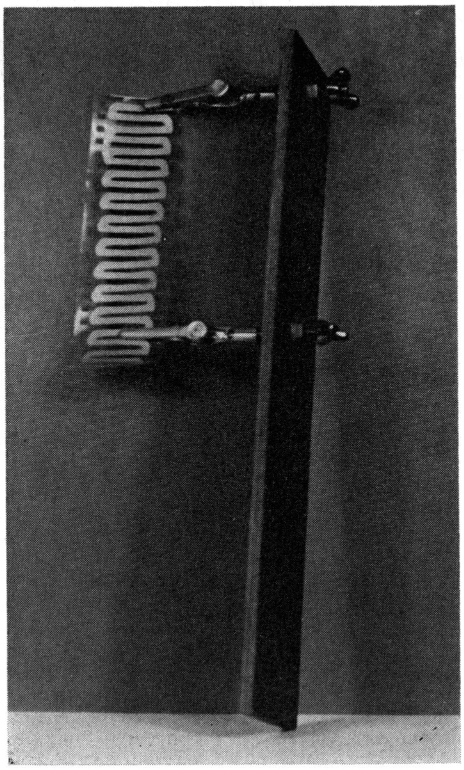
holder system for screens like ours as illustrated, will be more convenient and reliable. The pencil lead first break may be used very close to the gun mouth, even in contact with it. The components for this plan are cheap. Damage from a wild shot is easily fixed for pennies. We often, even usually run ten shots through 12″ (one foot) of Hollywood tape for 1½¢ per shot for the stop screen. We haven't found a way to beat this with equal convenience and reliability.

Aluminum foil or tinsel may be used. We can hit two strands of this even with the revolvers, and two pencil leads at ten foot spacing also. My time is worth more than you realize. It is your most essential pen require the loading of extra rounds, time to fire added tests, and this is a cost in time more than many busy people will wish to pay. If you have the hours to burn, then these foil strips, or any cheap frangible screen is quite good enough, and use it without hesitation.

If you experiment with loads, or wish to do so, you need a chronograph more than you realize. It is your most essential tool. An ITCC Model 240 or 245 will serve you well, adequately, accurately, and with satisfaction, from Industrial Timers and Controls Co., 10552 Cochran Ave., Riverside, California.

ELEMENTARY NOTE: The number displayed by a chronograph register is time in 1/100,000 seconds, normally to three digits. Screens are commonly spaced 10 feet apart. Then a reading of 333 is .00333 seconds. Since s=Vt, V=s/t, and so 10 Feet/.00333 seconds is 3000 F. p. s. Binary code uses a 1, 2, 4, 8 register. The sum of the lighted digits is the reading: none lighted is zero (0), 1&2 is 3, 1&4 is 5, 2&4 is 6, 1&2&4 is 7, 1&8 is 9, single numbers obvious.

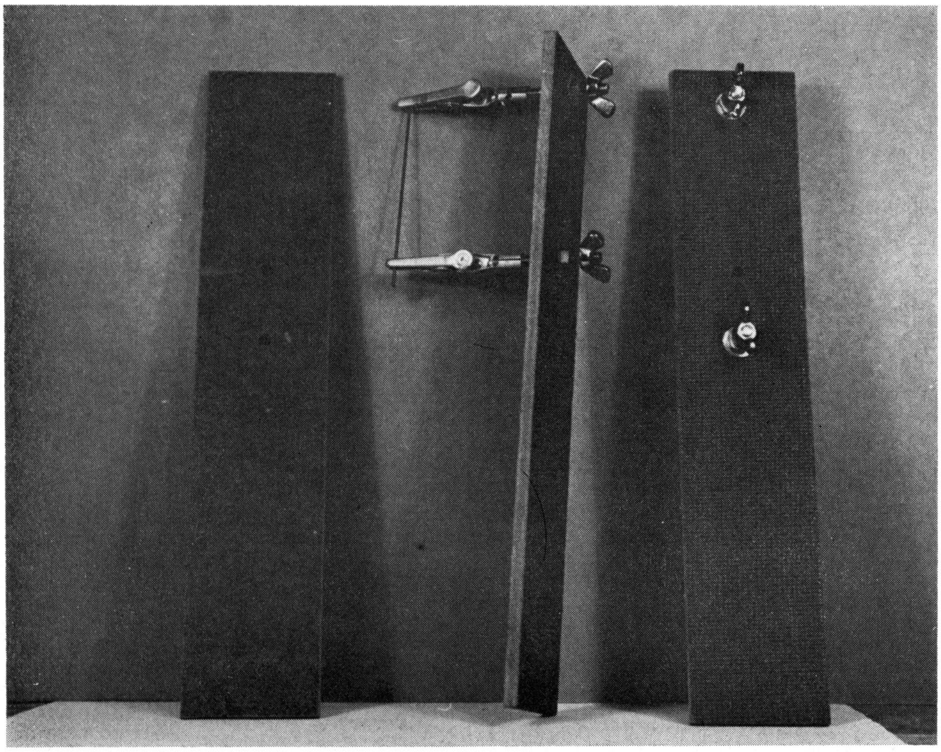
ITCC for $34.50 offers a converter to use the battery powered Model 240 and 245 with house power, 115V 60 A. C.



HOLLYWOOD TAPE silvered chronograph screen in Yard holders. Use tape directly from roll (not shown), pulling up just enough for each shot to re-make circuit,—in our opinion the least expensive fully reliable break screen.

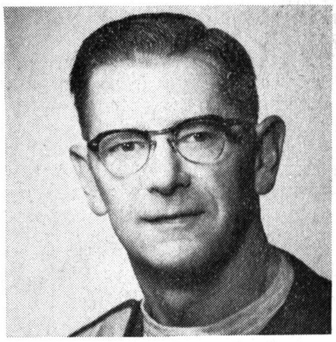
More than likely you'll be happy for the battery feature keeping you free of power lines, but when town bound, you may save the high cost of stored energy.

An Experimental Ballistics Associates
Test Report



YARD Type Screen Holders; made of 3/16″ Masonite hardboard (tempered) 1¾″ by 9″, with Scripto fineline pencil lead held in alligator clips 2½″ apart, for the first (start) screen. Clips are supported on studs with 8-32 thread held to board with nuts. Wing nut is to fasten lead wire to stud. Extra hole is for 3½″ spacing used with Hollywood tape, as in back view.

Ask L. G. Rackel, 1964 Wimbledon Winner,* about Sierra Bullets . . .



"Your **Matchkings** were very good to me each time I squeezed the trigger of the .300 H & H magnum rifle in the 1964 National Match 1000 yd. Wimbledon Cup and Leech Cup competitions . . . A possible 100 with 13 V's in the Wimbledon got me into that shoot-off. In the first shoot-off I compiled a score of 50 and 9 V's. The shot-by-shot shoot-off lasted for 9 rounds in which I took 8 V's and one five. This adds up to **79 Matchkings fired for record at 1000 yards, all of which were in the bulls eye. Of this total 59 went through the V-ring.**"

*

This world famous 1000 yd. contest has been won by riflemen using Sierra Bullets in the last 11 out of 12 matches.

Mr. Rackel used Sierra's 190 gr.
Match-king H.P.
(one of four 30 cal. Matchking Bullets).

SIERRA BULLETS

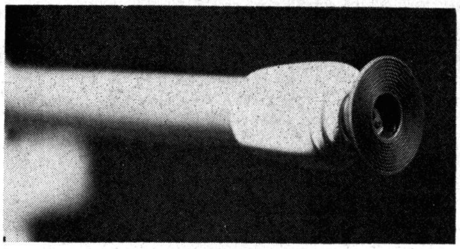
10532 S. Painter Ave., Santa Fe Springs, Calif.

AN OLD SIGHT WITH A NEW LOOK

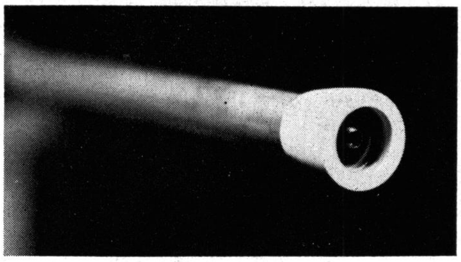
By Thomas V. Fitzgerald

With the interest in international type shooting on the increase, more and more you see the old iron sights being dusted off for position shooting and the corresponding groans beginning. While attaining a high average with a scope is a creditable goal doing this with iron sights really gives a shooter a sense of accomplishment. If you are a constant scope shooter with a good average and would like some "instant deflation" just try the reduced ISU target at 50 feet in prone, sitting, kneeling and awful hand, either with scope or iron sights, believe me it will be a revelation. I was one of these people and after skittering around in the low 170's with iron sights on the ISU target I decided it was time to start from the beginning and carefully analyze my equipment along with each of my positions. I took my first critical look at the sights I was using. I was never satisfied with the picture I got nor did I ever feel really comfortable with them. I was using the Anshutz rear sight coupled with a 1 inch diameter Freeland front. I had had Norm Gersly (of the Gersly action fame) make me up a ¾ inch block to raise the Anshutz rear to telescope height. I ground flat and adapted a D base to match the flat muzzle on the Anshutz and adapted the clear inserts to take Vaver inserts by tapping with a 9/32-40 tap. This combination proved effective but I still had the feeling something was left to be desired. I always liked the principle of the tube sight but never thought the small ¾ inch tube gave the shooter enough view and therefore the chance for cross firing was greater with this type sight than the standard front and rear combination.

With this in mind I experimented with a couple of 1 inch diameter tubes John Unertl was kind enough to make up for me, both being 22 inches long, one with and one without baffles. Both tubes worked out well and since I was shooting the big 2 inch Unertl scope at the time, the one inch tube gave me the same height at the comb for both iron and glass. But the alignment not being concentric when going from 50 to 100 yards still bothered me. This arrangement, though, proved to be good and my scores improved and while not attaining the optimum, I was convinced I was on the right track. This all leads to what you see, a full length tube sight. The fundamentals of shooting iron sights are to keep the eye in the middle of the rear sight aperture, the front sight hood centered in the rear aperture, and the bull centered in the front aperture. When all these are concentric you are supposed to squeeze the trigger. This may be fine procedure for prone when you can spend a bit more time admiring the sight picture but when you are standing on your hind legs you do not have the time to fool with the dressing up of a sight picture. It's got to be good the first time around. (Russian shooters train to fire 10 seconds after the first pressure to the trigger is applied). I did not think it helped any to have my eye checking three variables at once while trying to concentrate on squeezing and coordination. The thought of trying to eliminate some of this eye exercise made me decide to experiment with the elimination of at least one of these variables. I knew of course I could not do away with centering the bull or aperture in the rear sight but why not the hood in the rear aperture? To do this all I would have to do is couple the rear and front sight together . . . Voila, the aluminum tube sight was born.



How the cane-tips were used for holding front and rear sighting apertures during preliminary experimenting with the tube sight.



It is made from a piece of standard hardware store Reynolds 1 inch aluminum tubing 30 inches long utilizing Unertl 1 inch mounts. Before I had the rear plug and front aperture holder machined I tried it first using #20 1 inch rubber cane tips and the 1 inch mounts from my scope. One tip with the bottom cut off and the other with a hole punched center with and awl into which the rear disc was pushed. While this arrangement did not hold zero if knocked about, it served to prove that the idea was practical and an improvement over anything I had yet used to point a rifle . . . excluding of course a 30X scope. I also experimented with shorter sight radii by hacking off the tube in two inch increments on the theory that a long sight radius is not necessary for accuracy. I found this to be true and settled on a 31 inch tube length (measured from the Merit disc to the front aperture). Of course as you shorten the tube the aperture comes closer to the eye becoming larger in size while the aperture ring become thicker. To compensate for this I used the following formula in selecting apertures:

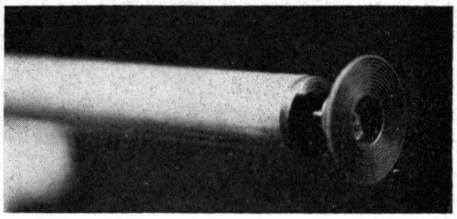
$$\frac{\text{New Sight Radius (3 1in.)}}{\text{Know aperture diameter at 34 in.}} \quad X \quad \frac{\text{Old Sight Radius (34 in.)}}{\text{X or aperture size at 31 in.}}$$

EXAMPLE:

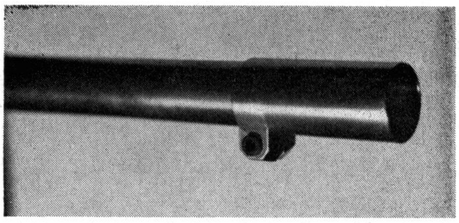
$$\frac{31''}{.150} \quad X \quad \frac{34''}{\text{X (or in this case 164.51}}$$

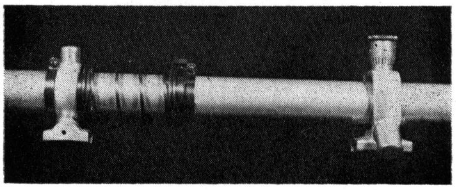
For certain, I could have used a 34 inch tube, the normal sight radius, obviating the necessity for these calculations, but then that would have been too easy (and the last piece of aluminum tubing I had left was 30 inches long). I shot with the tube as described and never found the interior reflections bothersome until someone called them to my attention. Finally I gave up trying to ignore them and coated the interior with Comet Cleanser. This was easily done by filling the tube with shellac, emptying it and filling it with the powder, while the shellac was still wet. This broke up the light rays sufficiently and gave me the tunnel effect I desired.

A few who have tried my tube and liked it made up their own only using ¾ inch tubing. Since the diameter of the smaller scope tubes is ¾ inch they utilized their scope mounts for the cane tip experiment before going to the expense of purchasing additional mounts and having the aperture holder and plug made up. They did, though, have to turn down one inch apertures to ¾ inch for the experiment. I have since switched from the 2 inch to the 1½ Unertl and find the measurement between boreline and the centerline of the 1 inch tube and the 1½ inch scope to be only 3/16 of an inch difference, not at all bothersome.



The front and rear aperture installation on the finished tube sight.





The tube in its target scope mounts.

This type of sight is by no means new. I thought it best to mention this before I antagonized any Civil War buffs who might think I was attempting to take credit for its invention. It was used in the 1860's and it is seen later on some Sharps Rifles. In fact, since I have been shooting mine I have been told of many different sights of this type brought out over the years and even one that was jointed like a fishing rod. From what I can gather they all seemed to have one thing in common and that was they were steel and blued. The draw back came when the tube would heat up in the sun and mirage was experienced within the tube itself. The use of thin walled aluminum tubing does away with this problem, in fact when the barrel of the rifle is hot to the touch, the result of shooting in the sun the tube is only luke warm. Apparently the reflective qualities of the polished aluminum does a lot to help prevent internal mirage problems.

The sight does not lend itself to the use of the post or standard steel apertures that have a vertical or horizontal bar used to check for cant, in fact one of the contributing factors that led me to selecting the one inch diameter tube was to be able to utilize the selection of Freeland Apertures which average .005 under one inch and snug up well. I have marked all my inserts indicating top and bottom and seat and reseat them in the same position each time I change apertures and have experienced no variation as to zero. The tube does not have a recoil rib which I have not found a disadvantage. If a recoil spring is used and kept tight there is no rotation of the tube. The only problem I have experienced is that the steel buttons in the mounts tend to tear the soft aluminum when the eye relief is changed but I intend to replace these steel buttons with nylon which should alleviate the condition.

This sight has really increased my shooting pleasure and of course this is basically what I'm after. It is no cure all. It does not make up for shortcomings in position, poor trigger control or any other easily bypassed fundamentals but I find myself practicing more with iron (aluminum) sights and the good habits I am acquiring due to the demands of the smaller ISU bull are being carried over to my scope shooting and has definitely raised all my position scores. The apertures I use? . . . as the man said when he kissed the mule "everyone to his own taste." My 50 and 75 foot aperture was .169 when I finished reaming it out and the only reason I stopped there was due to the fact I ran out of reamers. The USAMTU recommends 140 to 160 for gallery and for international 146 to 165. To illustrate the point . . . Roy Dunlop once wrote in Precision Shooting that he could not see through Emmett Duncan or Allan Lukes apertures, they were so small, and on the other hand his team mate's aperture was o lagre it not only took in the target frame and half the back stop but the number boards as well . . . and they all shot possibles. His point? DO YOUR OWN EXPERIMENTING. Adaptation and variation of positions and equipment used by the champions, determination, attention to detail plus positive thinking and an analytical approach to shooting will undoubtedly put you near if not at the top of the league bulletin. Harry Pope summed it up well when he wrote "A good score is not made by a large number of perfect shots, but by the absence of poor ones."

HEAT TREATMENT AND AGE HARDENING OF BULLET ALLOYS

By A. J. Hammer

Part III.

Quench-Hardening of Bullet Alloys.

In Part II of this series, it was shown that lead alloys containing antimony could be hardened by subjecting them to a heating-quenching-aging process. The extent to which the alloy is hardened by this process depends upon several factors (1). (Numbers in parentheses refer to the references in the bibliography at the end of this article.) Among these factors are the composition of the alloy, the temperature used in the heat treatment and the length of time the alloy is heated prior to quenching. It was shown in Part I of this series that in order to obtain the maximum increase in hardness in a lead-antimony alloy, these factors should be accurately controlled. It was also shown that a considerable increase in hardness of several bullet alloys could be obtained by using a modification of the heating-quenching-aging process originally described by Dean and Hudson (1).

James V. King (2) had mentioned that bullets may be hardened by dropping them into water directly from the mold. The following experiments were done to determine the extent to which several antimony-lead and antimony-tin-lead alloys can be hardened by quenching the hot alloy cylinders in water. As was done in Part II of this series, a sufficient number of alloy cylinders were cast from each alloy to enable hardness measurements to be made over an extended period of time, thus showing any change in hardness during aging of the alloys. A duplicate set of cylinders was also cast from each alloy and allowed to age at room temperature to show any change in hardness of the alloy when allowed to cool slowly in the usual manner.

The source of antimony used in preparing the lead-antimony alloys was a 10% antimony-90% lead alloy obtained from the National Lead Company. This was mixed with pure lead in the proportions necessary to give the series of lead-antimony alloys used in the experiments. The tin-antimony-lead alloys were of the same composition as the alloys described in Part II of this series.

The temperature used in casting the test cylinders was 750°F. as indicated by the temperature control dial on the SAECO casting furnace. When casting test cylinders from each alloy, a sufficient number

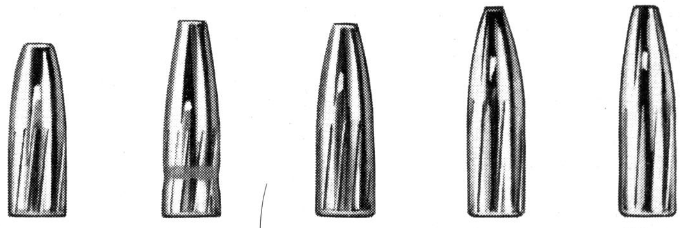
(Continued on Page Thirteen)

EXPANSION
TESTS
Remaining Velocity

HORNADY 30 caliber BULLETS

150 gr. SP 2030 fps
180 gr. RN 2083 fps
180 gr. SP 2058 fps

COMPETITIVE MAKES



150 gr 2014 fps
150 gr 2020 fps
150 gr 2022 fps
180 gr 2097 fps
180 gr 2094 fps

Remaining velocity of most 30 caliber bullets at 300 yards is approximately 2,000 feet per second. Bullets must expand at the striking velocity to make clean kills at long range.

Bullets are tested by loading them to the 300 yard remaining velocity and shooting them into wet newsprint pulp.

Illustrated are Hornady 30 caliber bullets that successfully met this test and bullets of ordinary construction that failed. Many bullets fail to pass this and other laboratory tests. Only bullets that meet these tests are dependable for distant kills.

Constant research, combined with our determination to make the very best has resulted in newly improved bullets—the most deadly we have ever produced.

BULLETS FOR HANDLOADING • SEND FOR LIST

Hornady
BULLETS

HORNADY MFG. COMPANY - DEPT. PS - BOX 906 - GRAND ISLAND, NEBRASKA

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Orchard Park, New York
Area Code 716, TX4-4433

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NBRSA MEMBERSHIP DUES:

Individual annual dues $6.00 (includes magazine subscription for membership term). Associate member (wife or husband, son or daughter under 18 years of age, of member in good standing—no magazine) $2.50. Life membership $75.00. Annual club affiliation fee $10.00.

PRESIDENT'S CORNER

Today is the 11th of January. I have waited as long as possible for all mail to come in, before writing this President's Corner. In order for this material to appear in the February issue, it must be in the Editor's hands by no later than January 12th. Seriously, I do like to hear from the members. The more you write the better the job we can do. I received a letter from Larry Elliot of Crocker, Mo. and I think he well summarized the discussion on the Varmint and Sporter barrel rule in the last sentence of that letter; "No amount of rules are going to make a bad barrel shoot good, a novice to shoot like a pro, or a winner out of one every time."

This is about the time of year when I start polishing the guns and start designing a new one,—which I surely do not need. Are you getting anxious to again fire some of those hot groups or "barn-burners" as Charley Hankins used to call them?

Now to get to some more serious business. I should like to report upon the activities which will be undertaken by the N. B. R. S. A. for this coming year. We have a new project in the works. This consists of working with Precision Shooting to prepare and print a series of articles on the bench-rest game and all phases of it including stocks, barrels and shooting techniques. It is thought that by this co-operative venture we can serve you well and help each other.

In entering upon this new shooting season for 1965, we should keep in mind that the National Championships will be held in the Eastern Region. The location of the shoots and the exact dates and programs will not be established until the winter meeting of the Eastern Region which will be held at Rochester, N. Y. on January 23 and 24. Full information will be announced in the March issue of "Precision Shooting." It would be my thought, that an attempt will be made to set up a schedule, whereby the Varmint Nationals would be held on one week-end and the Unrestricted Bench Gun Nationals on another week-end. This would allow maximum travel time from other regions, easing the burden of attending both shoots on one trip.

The 1966 Varmint and Sporter Nationals will be held in the Gulf Coast Region. The 1966 Unrestricted Bench matches have not yet been awarded. As soon as they are you will be advised of the region in which they will be held.

At the Directors' annual meeting held in Tulsa in September last year there were various changes made in the rules. Some of these changes concern themselves primarily with clarification of existing rules. Some of the changes on the other hand were substantial. A summary of these rule changes is printed separately. The complete new rulebooks will be going to the printer this month. After that you can purchase them through Bernice McMullen, our secretary.

Cordially,
Brunon V. Boroszewski

EDWARD E. McNALLY
(1954 photo)

EDWARD E. McNALLY

Edward E. McNally suffered a fatal stroke at his home in Sarasota, Florida, on December 20th, at age 66.

Ed was a past Director for Eastern Region NBRSA and served three terms as NBRSA President (1955 through 1957). He was the winner of the first NBRSA shoulder-to-shoulder National Championship, fired at Custer, South Dakota in 1954, and very regularly placed in the "Top Twenty" in the National Championships he competed in thereafter.

A native of Chicago, Ed resided in Syracuse, N. Y. for 25 years, until he retired in 1958 as sales manager for Vivid Division of the L. C. Smith Corp. after 25 years with that Company. After retirement he made his home in California for two years and then moved to Sarasota, Florida, but spent most of his summers among old friends in the Northeast. He was a Navy veteran of World War I.

He underwent major surgery in early summer of 1964, but was in attendance at the Johnstown, N. Y., Labor Day Bench Rest Shoot as a visitor. On his way south to his Florida home later in September he suffered a stroke, but seemed to have made good recovery from that, to the point of attending some social functions and shooting his bench rifles weekly in company with a couple of his local friends.

He is survived by his wife, Claire, three daughters, two brothers, two sisters and eight grandchildren.

RULE CHANGES

These are changes to the last published rulebook, as in the gray cover. Affected sections now read as follows:

SECTION I

B. DEFINITIONS

1. BENCH: A bench shall be a rigidly constructed table, and being of a height to permit a shooter of more or less than average height to sit comfortably thereat by merely increasing or decreasing the height of the stool on which he sits. It shall preferably by constructed to permit firing by either a right or left handed shooter.

2. **BENCH REST RIFLE:** Any rifle having a barrel 18 or more inches long, measured from the face of the bolt to the muzzle.

3. **VARMINT RIFLE (HEAVY):** Any rifle having a safe manually and mechanically operated firing mechanism weighing not more than thirteen and one-half (13½) pounds, inclusive of sight; with a stock having a flat or convexed forearm, and total stock width not more than three (3) inches, having a toe formed by an acute angle, not greater than that formed by a straight line drawn from the toe of a substantially vertical butt starting at a point at least four (4) inches below the axis of the bore and extending forward to the bottom of the barrel at a point eighteen (18) inches forward of the bolt face, and a barrel not less than eighteen (18) inches long. A diameter at and not more than four (4) inches ahead of the receiver ring of not more than 1.250 inch and a diameter at any point between the muzzle and a point four (4) inches ahead of the receiver ring not greater than would be defined by a straight taper between such point four (4) inches in front of the receiver ring at 1.25 inch diameter and the muzzle at .900 inch diameter at 28 inches.

13. **RESTS:**

(d) **SAND BAG** shall be a bag without additions or container the cover of which shall be capable of being easily flexed by the fingers and the contents of which shall be of dry finely divided nonmetallic substance such as, but not limited to, sand, gravel, or grain, without additive, packed loosely enough so that the bag shall be easily deformable by pressure of the fingers.

New 14. GUIDING MEANS: Any device, addition, contour or dimension on the stock of a rifle of any class, designed or adapted to coact with mating or reciprocal features of a rest to guide its return to firing position so that it shall not be necessary to re-aim the rifle optically for each shot shall be conclusively deemed to constitute guiding means.

SECTION III
TOURNAMENTS

G. Varmint and Sporter Rifles, Rests: Tournaments for Heavy Varmint Rifles, Light Varmint Rifles, and Sporter Rifles shall be fired with Sand Bag front rests, which may be supported on a pedestal which shall not coact with the sand bag to form a guiding means, and a rear rest, comprising a sand bag supporting the rifle between the rear of the pistol grip and the toe of the buttstock.

NEW VARMINT AND SPORTER COMPETITION

At the last annual meeting your Directors authorized the firing of five shot groups at 300 meters in heavy varmint, light varmint and sporter classes. This means five match aggregate at 300 meters will be recognized, as well as the 200 yard—300 meter combined aggregate.

For those ranges having the facilities, this will mean the offering of a new and challenging varmint competition. We look forward to the clubs offering and the shooters competing at these long ranges. Who will schedule the first competition?

Brunon Boroszewski

VARMINT RIFLE AT RICHMOND, CALIF.

What was intended to be a registered Varmint Rifle class match at the Richmond Rod and Gun Club on December 7th turned out to be an un-registered shoot when a reduction gear broke on the moving backer mechanism just before record firing started.

Thirteen shooters fired the 100 yard matches but three dropped out after the 100 yard stage was fired.

Ed Suchan from Oakland was aggregate winner at 100 yards with .2998, was second at 200 yards with .3822 MOA, and won the Grand with .3410. Tom Squires from Sacramento was third at 100 yards with .3659, won the 200 yard aggregate with .3645 MOA, and was second in the Grand with .3652. Allen Hobbs from El Cerrito was second at 100 with .3618, fourth at 200 with .4597 and third in the Grand with .4107.

Kit Puett from Lakeport was fourth in the Grand with .4749, and Don McLennon from Concord fifth with .4898.

Hobbs shot a .219 Don caliber, the other four all shot the 222 Rem. All used Hart barrels. McLennon and Squires shot Sierra 53 gr. bullets, the other three their own hand-made bullets. Squires used 4198 powder, the other four all used Ball-C powder. Suchan's rifle was on a Shilen action, Squires' an FN Mauser, Hobbs' a Weber, Puett's a Remington, and McLennon's a Remington 40X.

CALIFORNIA HUNTING RIFLE MATCHES

A first trial bench rest match for Hunting Rifles at the Richmond Rod and Gun Club range, Richmond, California, was held on December 8, 1963 with 43 shooters firing five 5-shot matches for score and a possible 250 aggregate score. The minimum caliber was .240, maximum weight was 10½ lbs. and scopes were restricted to the fixed-mount hunting type. The range is 100 yards and the target the 50 meter smallbore rifle target. At that first match, two experienced benchrest shooters took the two top places, with a 239 winning score and 228 for the runner-up.

At the second match on February 9th, a weatherwise bad day, there were 41 shooters. The two top aggregates of 228 were fired by 16 year old Barbara Bliss and relatively new bench rest competitor Stuart Harvey.

A third match on April 12th had 51 competitors. Henry Smith had winning aggregate of 227. Stuart Harvey and Thomas Squires were second and third, both with 226 scores. All three were second-year NBRSA members.

On June 14th a fourth match was held with 53 competitors. Kit Puett, an experienced Varmint Rifle Class competitor, won this one with an aggregate score of 230. Henry Smith and Ken Hobbs had aggregates of 226.

The matches were discontinued for the rest of the summer and autumn but on December 13th sixty-eight shooters gathered for the fifth match. Stuart Harvey won this one with a 235 aggregate. The next four places went to new shooters—Hukkanen 234, Joseph Korinek 233, and Don Eutenier 233.

Over 100 shooters have participated in one or more of these matches and at least 75% of them in two or more of the matches.

Calibers used in the matches range all the way from 6mm to 7mm and .30 caliber magnums. One shooter fired one match with a Winchester 1876 model in .45-60 caliber, and another with a model 1894 Winchester in .25-35 cal. While the 6mm caliber predominates in the top third of the ranking lists, .25 and .30 caliber rifles have won some of the matches and they, with the .270, are usually represented in the top ten in all the matches. The .30 caliber rifles challenge the 6mm's in point of numbers used, but not in the ranking lists. A few of the shooters have shot with metallic sights, and they haven't been at the bottom of the ranking lists.

THE 308 FOR UNRESTRICTED BENCH REST SHOOTING

By Robert W. "Bob" Hart

Due to the fine showing that this caliber has made in the past year and a half, I will relate our experiences (my son Wally and myself) with it, hoping that it will be of some help to those who are planning to use one. I will describe in some detail the parts of the guns, the ammunition we have used, and the methods of shooting that we have found successful.

THE STOCK: We use an unrestricted bench rest type, approximately 3¾" wide at the forearm and bottom of butt. The under side (bottom) of the forearm and butt-stock are finished parallel to the barrel. This gives a straight-line recoil.

The underside of the forearm is flat and machined out in the center, this leaving a bearing surface or rail on each side. We mount a bar of brass or equivalent, approximately ⅝" in diameter, lengthwise under the center of the butt, and bed this in the sand bag, when shooting, to help eliminate the tendency of the rifle recoiling to either side. There are many other versions that other shooters like that work equally well and each shooter should choose accordingly.

ACTION: We use our own manufactured action. This action is approximately 1.725" in diameter and 15¼" long. We feel that a sleeved action is of great assistance on a 308. First, the scope is entirely on the action and, second, recoil and barrel weight will gradually spoil a fine bedding job on a short action.

BARREL is a Hart stainless, 1.350 in diameter, with a 1 in 14" twist. This will stabilize bullets up to and including the 168 grain Sierra International Match bullet. We have the best accuracy in this twist. If it is desired to shoot bullets of 200 grains or heavier, it will be best to use a 1 in 12" twist. Land and groove sizes within the recognized limits shoot equally well.

Our guns weigh 26 and 27 lbs. each. Recoil is often a great concern of those contemplating shooting a 308 in the unrestricted class. Using guns of the above weights, the recoil is not unpleasant. True, the gun does recoil, and if you are watching someone shoot it you get the impression that the recoil is rough, but this is not so. In fact, anyone who is familiar with recoil is rather amused when they first shoot a 308. The rifle fires and then comes pushing back, rather than the usual snapback from a light rifle.

The 308 in the Varmint classes is still in a stage of development. A number of rifles are in use and some very fine accuracy has been obtained, but there have been problems in holding the bedding, scopes shooting loose, and of course a recoil that presents a problem of consistent shooting by the competitor. Many a fine Sporter or Varmint rifle has been condemned because the shooter did not properly shoot it. To obtain the best results it has been our experience that you must hold the rifle, BUT DO IT GENTLY, no gripping, freezing or down pressure, and can best describe it by saying, hold it like a tiny baby.

LOADS: Our loads for best accuracy have been 48 grains of H380 powder and 168 grain Sierra International Match bullets, with CCI primers. Have also tried 42 grains of 3031 powder with good results. Remington 9½ primers also work fine in these loads. **WARNING:** These are maximum loads and should not be fired until testing is done with reduced loads, gradually increasing powder charge and checking pressures until the maximum **for your rifle** is reached.

CASES: Some experimenting has been done by changing the shoulder on

(Continued on Page Twelve)

308 For Unrestricted Bench Rest Shooting

(Continued from Page Eleven)

the 308, such as jetting and shortening. Our experiences have been with the standard 308, and happily so for I dislike laboring with wildcat cases and as of now see no reason for it.

SHOOTING: This is a fine rifle to shoot and especially so when conditions are present, and they usually are. One thing is most certain and that is, this caliber is no advantage or disadvantage in mirage. This is an illusion and must be solved by each individual shooter. As to wind conditions, we feel that under mild wind conditions the 308 will drift about 50% as much as the popular bench rest 22 calibers do. Under extreme winds the percentage seems to be greater, but we have not had enough experience to make this a positive statement. The advantage of using the 308 caliber is obvious when you consider the reduction in necessary hold-off for wind conditions, and also for that ever possible error in misreading conditions, your holding error is reduced.

SHOOTING POSITION: We strongly recommend that when sitting down at a bench to shoot this caliber, place your body as nearly square with the gun as possible. Should you sit at an angle, or to one side, the gun will recoil off your shoulder, causing side-to-side dispersion. I think this is true of all calibers but is more pronounced with the 308.

About a year ago much concern was felt that some shooters would use a 22 caliber for the 100 yard shooting and a 308 caliber for 200 yards, and by so doing, gain a distinct advantage. This worry can be forgotten, as the actual shooting records of the past year will show that far more matches and places were won by competitors who used the 308 all the way (at both ranges) than were won by combination caliber shooting. Many of us have believed that under ideal conditions the 22 caliber will out-shoot the 308, but after witnessing several match performances last year I have some doubts that this is so. In addition, the major part of the 308 shooting done last year was done with commercial bullets, against the finest of hand made 22 caliber bullets. Work is in progress to produce like quality bullets for the 308 and it is only reasonable that this will further improve accuracy.

If you enjoy shooting you surely will enjoy shooting a 308.

CROOKED CREEK BENCHREST SHOOTERS GUTHSVILLE ROD AND GUN CLUB 1964 COMPETITION

The Alfrom J. Moyer Memorial Trophy for competiiton in .22 caliber as well as the Memorial Trophy in large bore will be presented to the same shooter. He is Harold E. Niebell of Allentown, whose group aggregate for the .22 matches is 0.4341 inches. His aggregate for the larger bore class, which includes .24 caliber (the six millimeters) through .30 caliber, is 0.5345 inches.

Niebell broke the Club record in larger bore established by Bruce R. Romig in 1963. He is a PBX installer for Bell Telephone, with 37 years service. He has been Chief Rifle and Pistol Instructor and Hunter Safety Instructor and received one of ten commendations in the state. He has taught the junior shooters for almost 20 years.

In a new category of competition established this year for deer rifles—.27 caliber and up with a four power scope limit—the Moyer Memorial Trophy goes to Roland F. Hilbert, Jr. of R. D. #1, Allentown. His aggregate for the six out of ten record groups is 1.0766 inches.

The matches were shot at 100 yards, with the groups measured center to center of the widest placed shots.

The smallest five-shot group in .22 was fired by **Fred Welty—0.282 inches,** while Niebell himself accomplished this in larger bore with a **0.327 inch group,** breaking the old record of 0.366 fired by Dr. William F. Fox in 1962. Hilbert fired the smallest deer rifle group throughout the season—0.745 inches.

A Moyer Memorial Trophy for .30 caliber from 1957 will be awarded to Harold J. Rauch of R. D. #1, Kempton.

The Alfrom J. Moyer Memorial Trophies are awarded annually in honor of the late Coplay businessman and sportsman. Al Moyer was a hunting and shooting enthusiast, Boy Scout leader and outdoorsman, who pioneered benchrest shooting, precision riflemanship and handloading ammunition in the area.

REGARDING BULLETS

By Bill Purcell

I had intended to save this story as part of an article in depth on bullet making but time and procrastination set in so I pass this part on with the hope that it will save some shooter from making up a season's supply of bullets that will not stay inside the corn crib. The pearls of wisdom dropped here are not creations of my genius but are the result of the evening bull sessions with five or six of the shooters whose names usually appear at the head of the scoring column. My contribution has been to check out some of the theories and report them.

The story of a set of 6mm dies will perhaps best illustrate the points I wish to make. When I first started to make dies I had never heard of the cup base of the core seating base punch so made mine flat. About this time the cup base came into disrepute because a few shooters, probably because of worn parts were getting poor results so I went along happily with the flat punch. My first batch of bullets averaged .0002" in concentricity on a borrowed spinner and shot well. At the last Fassett match another batch made from the same box of cores, same dies and same set up were terrible. Ted Boughton's spinner showed wide variations in concentricity, some over .001"! Back home to build a spinner and look for the trouble. The first test showed that I had not seated the cores hard enough. When I got to really whomping them down the bullets dropped to about .0003". Fairly good but not as good as the first batch. Kicking this around with Ed Shilen, Ed told me that he had discovered that by not degreasing his cores he found a very considerable improvement. I then recalled that I had not degreased the first batch but had degreased the bad batch. Back to leaving the grease on the cores. Just wiping off any excess on a dry towel and I'm down to .0002" or better. This accuracy is generally thought to be acceptable but one feature bothered me. All of these bullets showed one or more instantaneous "ticks" when spun. The tick would kick the indicator needle about .0001" but was so "pin pointed" that the peak could not be measured. Kicking this and the remaining .0002" around with Ed he told me that he had been thinking of cupping a core seating base punch. I left my core seater with him and he cut a cup with a carbloy tool. I do not know what magic he uses because although he has told me how he does this in very hard steel the secret eludes me. He has just reported that, using his bullet swage he gets bullets that are spinning practically zero. Prior to the cupping his results were about the same as mine.

Now some opinion which is backed by theory but is difficult to prove excepting indirectly as above. When we press the base of the jacket against the flat base punch in the core seating process there is a rather large area at the corners which is unsupported as the lead flows out to expand the copper into the corners. Because the best commercial copper we can get is not homogenous some of the unsupported areas will stretch more than other areas. If we could exert enough pressure (although for other reasons this may not be desirable) to squeeze the copper out into a sharp corner we would probably get a near perfect base. Because we cannot do this we get a seated jacket which, although it may be perfectly round in the cylinderical portion, has an imperfect base radius. The friction between the ungreased cores and the copper appears to aggravate this stretching. Now someone is sure to point out that the greased cores do not stick to the jackets as well as the ungreased ones and I cannot quarrel with this. But I do believe that the little ridges we get on the inside of the jacket when swaging (if you have not tried this file a bullet in half from end to end and prick out the core) are adequate and a good base is the lesser of two evils.

There is another area I would like to investigate but because it will take considerable time to build the measuring equipment required has yet to be done. This is a measurement of just how square, or at right angles, the base of the bullet is to its axis. While I do not believe it to be, within reasonable limits, as important as good corners it is an area requiring investigation if we are to achieve those one hole groups. Bullets I have made in a heavy C press showed .0003" greater run out than in an O type press. The C press snapped into line after a tie bar was installed between the primer lips.

At this writing I'm convinced that many of the fliers we have blamed on a thousand other things were caused by bad bullets and that if we are to keep up with the constant shrinking of aggregates a bullet spinner is a must. Without it it is easy to make bad bullets in good dies and, like the old maid, go despondently on our way wondering.

Random Shots

(Continued from Page Three)

using the mail ballot." I distinctly recall voting in person in 1953 at the Convention in Washington, D. C. We were quite perturbed that the polls were only open until 2:00 p. m., which meant that the Life Members in the area who were working were unable to vote. We were, further, upset that the Nominating Committee had selected a man from the area who was unknown to all of the competitive shooters whom we polled except one, who was employed by the nominee. In 1952, when the Annual Meetings were in Jacksonville, Fla., I left most of the Life Members at the range practicing for the Nationals and went into town to exercise my vote. Arriving at 2:05, the polls had closed at 2:00 p. m., of which I had not been informed. How I wished that I had remained at the range and practiced!

Quoting a letter from Mr. Franklin L. Orth addressed to a Life Member, dated January 21, 1964, "You will note that some of the statistics which appear in this by-laws report are now somewhat out of date. The total NRA membership today is approximately 620,000. We have slightly more than 50,000 life members, and the size of the NRA Board of Directors has been increased from 60 to 75. Other than this, the factors represented in the report are as applicable today as they were when the report was prepared . . . . I believe you will find it of interest."

He did. You, also, would find it of interest, and I only regret that we are un-

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able to devote several pages to printing the entire report. By the time you read this, you may have received your ballot in the mail. I know the reaction of most of you will be, "Why bother to vote?" Certainly you have no choice. The only reason that I can suggest to you for taking advantage of your privilege to vote is that you can write in candidates as a protest. True, a write-in would be just that—merely a protest. But, if enough voters crossed out the same name and wrote in the same person, it would constitute a sizeable protest. Not sufficient to beat the system which allows no choice, but sufficient to let them know that you are not happy.

* * *

Here are the dates for the National Mid-Winter Championships at St. Petersburg, Florida—March 9, 10, 11, 12. The Silver Dollar Roundup follows, beginning March 13-15. We have already given you the dates of the Sawgrass. Florida really goes all out to give the shooter a complete mid-winter vacation.

* * *

Every autumn, about the second weekend in October, Austin, Texas, hosts a shoot. They really are hospitable folk, but we seldom read about who did what. This time, Bob Boydston ran into Bob Findley of El Paso, who told him that Cousin Lynn Roberson (whose aunt eloped with a Summerall, which makes us relatives) of McAlester, Oklahoma, did mighty well in Austin. To get the low-down, I wrote to "Cousin Lynn," whose reply follows:

"My fine little friend Raymond Sargent was the big winner at Austin. The Austin shoot was held on the Bergstrom Air Base Range, as the Austin club has lost their range where you shot. This range is out in the prairie country southeast of Austin.

"Ruth Morgan's 'LITTLE BOY' Robert started the show by winning the 50-yd., three position, iron sights, Rule 5.12, with a fine score of 580-27. With the beginning of the prone matches, Raymond pushed Morgan off the 50-Meter iron with 398-33 to 398-30. In the 50-yd. it was Raymond again with 400-31 and Robert (Bench Rest) Smith of Dallas with 400-24. This brings us to the third match, Dewar, where Capt. Ralph E. Doyle of Sheppard AFB took the bull by the horns with a 399-20 to Findley's 398-26. While the Good Captain was keyed up to such a fine point, he just calmly went ahead and took the final match (100-yd.) with a fine 399-22 to the 398-21 fired by Sgt. W. E. Johnson of Ft. Hood. The Iron Agg. showed Sargent, Morgan and Findley with 1591-107, 1589-109, and 1587-91. Inez and Robert Smith teamed up to take the team match, 50-yd., ISU target, with a fantastic 397-25. All this time Ol' Roberson was trying to make his Anschutz shoot with various odds and ends of ammo, all to no avail.

"Before the matches started Sunday morning, Inez said what I needed was some ammo that would shoot, so I accepted her offer of some Mark III and got out my faithful old 40X Remington for the scope matches and prepared for action. In the first match (100-yd.), it was Findley, 400-32 to Floyd Gibson's 400-31. In the second match Roberson got to the finish line with 400-36 to Inez' 400-28. (Ironically her kindness had cost her this match.) In the third match Roberson was still going with 400-35 to 400-33 by Gibson. This brings us to the last match, 50-meter, where Findley stopped Roberson cold with 400-35 to 400-34. In the Scope Agg. it was Roberson, 1599-134, Gibson, 1598-116, and Raymond, 1597-113. In the Grand it was R. Sargent 3188-220, Findley, 3183-217, and Morgan, 3183-216.

"I was pleased to find out I could still shoot when I had some good ammo. At the Bulletin Board after it was over, a man stepped up to me and handed me a box of LAPUA and said, 'Try this in the Anschutz.' But I have not had a chance to do it yet. I am sorry to slight the classes as there was some fine shooting done by the classes, but there was no competitor list with the bulletin and most of the shooters were military and unknown to me and just to say Smith or Brown did such and so would not make much sense without a first name or home town or base. There were 60 competitors and weather was nice except for a nasty wind."

Ol' Roberson continues, "Notice that 4 competitors each won 2 matches. Raymond's square action gun was in the hospital and he was shooting a 37 Remington in a Freeland stock. Believe the barrel was a Hart."

I am indebted to you, Cousin Lynn. This is the best tournament report anyone has ever sent me. You will note that I haven't changed a word.

Heat Treatment and Age Hardening

(Continued from Page Nine)

of cylinders were cast to bring the mold up to uniform temperature before casting those cylinders which were to be used in the experiments. It was assumed that all cylinders used in the experiments were thrown from the mold at the same temperature.

The quenched cylinders were faced and polished after quenching, which accounted for the delay in obtaining the first hardness measurement. Hardness measurements were made by the same methods described in Part II of this series.

The following are the results of Brinell hardness measurements made on seven alloys, both after quenching directly from the mold and allowing one set of cylinders to cool slowly in the usual manner. The change in hardness during aging for 120 days was measured for each pair of alloys.

Alloy 0.5A.

Composition, 0.5% antimony, balance lead.

An increase of only one Brinell number over that of the unquenched alloy was obtained. The age-hardness curves (Fig. 1) for this alloy were almost parallel over the period covered by the experiment.

Alloy 1.0 A.

Composition, 1.0% antimony, balance lead.

This alloy is of the same composition as one of commercial alloys commonly used for cable sheath. The alloy, as cast, had a Brinell hardness of approximately 7 after aging for 60 days, and very little change in hardness was observed after the test cylinders had aged for 60 days (Fig. 2).

The quenched alloy showed a gradual increase in hardness for the first 60 days of aging and remained practically unchanged for the remainder of the aging period.

After aging for 120 days, the quenched alloy had a hardness approximately the same as an alloy containing 10% tin and the balance lead.

Alloy 1.5A.

Composition, 1.5% antimony, balance lead.

After quenching and aging for 120 days, this alloy had a hardness of about 13, which places it in the "medium" hard classification (Fig. 3).

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Alloy 2.0 A.

Composition, 2.0% antimony, balance lead.

After quenching, this alloy showed an increase in hardness for the first 30 days of aging when it reached a hardness of 14. Little change in hardness was observed for the remainder of the aging period.

The unquenched alloy showed an increase in hardness of only one Brinell number during the aging period (Fig. 4).

Alloy 2.5A.

Composition, 2.5% antimony, balance lead.

Quenching and aging for 30 days increased the hardness of this alloy by 6 Brinell hardness numbers to a hardness of 15.5 (Fig. 5). Although quenching this alloy gave an appreciable increase in its hardness, this is far below the hardness obtained by an appropriate heating-quenching-aging process. As was shown in Part I of this series, an alloy of this composition can be hardened to Brinell number 28 by appropriate treatment.

In general, the hardness of antimony-lead alloys containing from 1.0% to 2.5% antimony will be increased by approximately 5 Brinell numbers by quenching them in water directly from the mold. This assumes that these alloys have aged from two to four months after quenching.

Several of these low antimony-lead alloys can be hardened sufficiently by quenching in water to place them in the "medium" classification of bullet hardness.

Alloy 3A2T.

(Continued on Page Fourteen)

Heat Treatment and Age-Hardening

(Continued from Page Thirteen)

Composition, 3% antimony, 2% tin, balance lead.

Quenching this alloy increased its hardness by about 8 Brinell numbers, after aging for 120 days (Fig. 6). After this period, the quenched alloy had a hardness approximately equal to that of linotype metal. The trend of the age-hardness curve for the quenched alloy shows that it loses hardness more rapidly as aging continues than the same alloy treated by the heating-quenching-aging process described in Part II of this series.

Alloy 1-1-18.

Composition, 5% antimony, 5% tin, balance lead.

The quenched alloy, after aging for 120 days, had a hardness greater than that of linotype metal, but the trend of the age-hardness curves indicate that the quenched alloy loses hardness rather rapidly (Fig. 7). After an extended period of aging, it would appear that both the "as cast" alloy and the quenched alloy would have a Brinell hardness approximately equal to that of linotype metal.

All of the alloys used in these experiments were hardened by dropping the hot test cylinders into water directly from the mold. The amount of increase in hardness varied with the composition of the alloy. With some alloys, the increase in hardness resulting from quenching is almost as great as that obtained by a heating-quenching-aging process although the quenched alloy sometimes lost hardness more rapidly than when it was hardened by a heating-quenching-aging process.

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"When you can measure what you are speaking about, and can express it in numbers, you know something about it."
Lord Kelvin

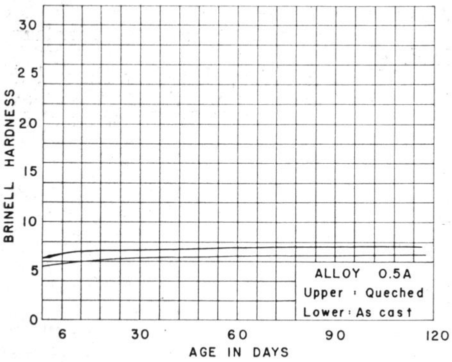


Fig. 1: The 0.5% antimony alloy showed an increase in hardness of only one Brinell number after quenching. There was very little change in the hardness of both quenched and the "as cast" alloy during aging.

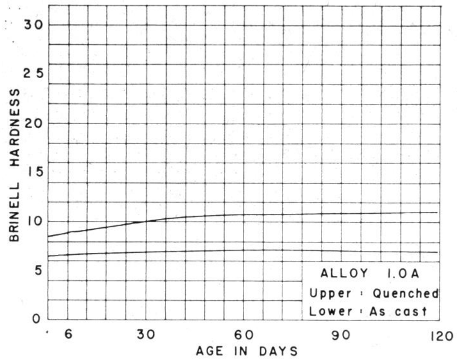


Fig. 2: Quenching the 1.0% antimony alloy increased its hardness from 7 to 11 after aging for 120 days. The "as cast" alloy showed no significant change in hardness during this period.

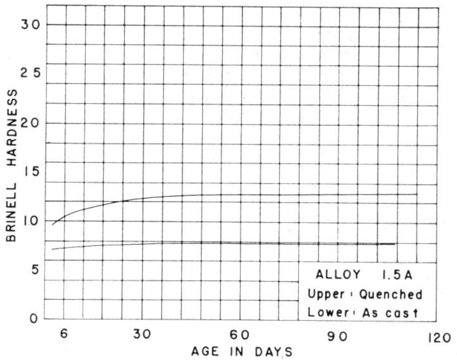


Fig. 3: Quenching the 1.5% antimony alloy and aging for about 50 days increased its hardness to about Brinell number 11. This is an increase of approximately 5 Brinell numbers over that of the "as cast" alloy.

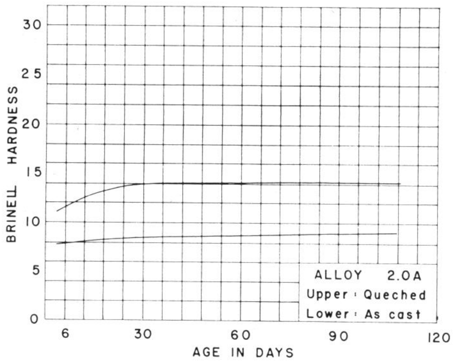


Fig. 4: Quenching the 2.0% antimony alloy and aging for 30 days gave a Brinell hardness of 14 which remained practically constant for the remainder of the aging period. The "as cast" alloy showed an increase of approximately one Brinell number during this period.

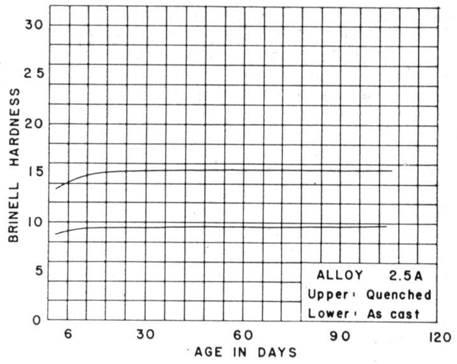


Fig. 5: After aging for 25 days, the quenched alloy had a hardness of approximately 15 Brinell numbers, which was about 6 Brinell numbers above that of the "as cast" alloy. Both the quenched and "as cast" alloys showed no significant change in hardness for the remainder of the aging period.

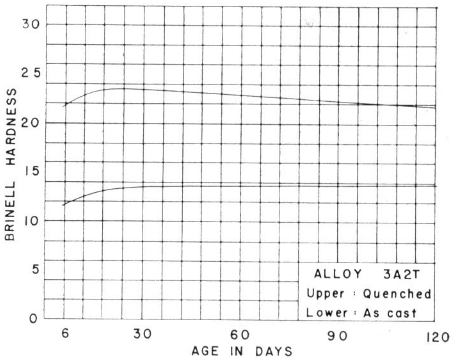


Fig. 6: The 3% antimony—2% tin alloy reached maximum hardness after quenching and aging for 24 days. The quenched alloy lost hardness rather rapidly after reaching the maximum hardness. After aging for 36 days, the "as cast" alloy showed very little change in hardness for the remainder of the aging period. After aging for 120 days, the quenched alloy had a hardness approximately equal to that of Linotype metal.

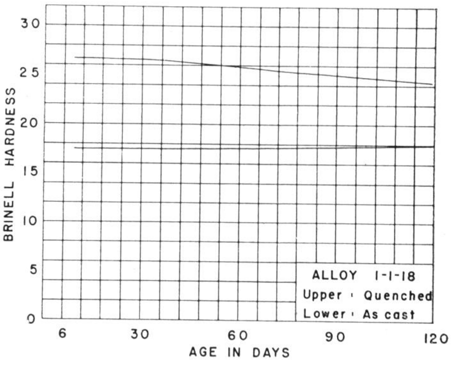


Fig. 7: Quenching the 5% antimony—5% tin alloy and aging for one week gave a hardness of almost 27, which was approximately 9 Brinell numbers above the hardness of the "as cast" alloy. The quenched alloy lost hardness rather rapidly during the aging but after aging 120 days still had a hardness greater than that of linotype metal. The "as cast" alloy showed little change in hardness during aging.

CASEHARDENING (?) OF BULLETS BY HEAT TREATMENT

A. J. Hammer

When describing the results of the experiments on heat treatment of bullet alloys to several shooters at the National Matches, some were of the opinion that this treatment gives a casehardened bullet and the interior of the bullet is not affected.

None of the literature or patents listed in the bibliographies accompanying this series of articles mention casehardening so it was assumed that the treatment gives a bullet of uniform hardness throughout.

In order to test the theory of casehardening, a test cylinder of the 2.5% antimony-lead alloy was hardened and its hardness measured. It was then refaced on a lathe, the new surface polished and the hardness measured at the new surface. This was repeated to obtain hardness readings at three depths in the test cylinder. The Brinell hardness values obtained at the surface and at the three depths are as follows:

Depth	**Hardness**
0	22
0.04″	21
0.09″	20
0.19″	21.2

These values show that there is no significant variation in the hardness of the heat treated test cylinder from the surface to a depth of 0.19″. It can be assumed that heat treated bullets up to approximately 0.4″ in diameter will be of uniform hardness throughout.

Bull-Session Stuff

A REPLY TO HALLBERG

Dear Mr. Hallberg:

From time to time I've read your comments in Precision Shooting and find them quite interesting.

In the latest issue (November 1964) you make a couple of comments that arouse my curiosity. First, you state that to improve cartridges we must shorten the distance from primer to bullet. While I'm certainly not in a position to argue that point either way, I am decidedly curious as to how you reached that conclusion. The comparison to an internal combustion engine doesn't seem valid to me. The burning characteristics of compressed gasoline-air mixtures and granular nito-cellulose base propellents seem (from what information is available to me) to be quite different. Then, too, the gun is already a far more efficient heat engine than the internal combustion engine.

Second, you state that sharply bottlenecked cases increase pressures. This is common theory, but one that has yet to be proven, so far as I know. It has been proven, however, by P. O. Ackley's experiments that sharply tapered cases such as you propose do increase thrust against the bolt face. Assuming that some reduction in peak pressure is achieved, can it offset the increased load on the locking surfaces? Have you taken this increased thrust into consideration?

You indicate a desire to use .348 Winchester cases to test your tapered case theory, but said they wouldn't fit actions available to you. Some years back I had occasion to alter .348 brass to rimless head. It's quite a simple process and the thick web of this case makes it entirely safe. Any desired rim diameter can be produced by following the "reduced-head" profile common to the .284 Winchester and several earlier foreign cartridges. A rim to fit standard H & H or 30/06 bolt faces can easily be produced. Years ago, Roy Gradle regularly built rifles for several calibers based on a rimless .348 case. Perhaps you might use this approach.

Sincerely,
Major George C. Nonte, Jr.

P. S.: The energy content of our propellents is known and constant; so much so that both velocities and pressures can be accurately computed without firing a single shot. Within practical manufacturing tolerances, any of our propellents will consistently produce the same amount of energy per unit of weight, provided other conditions remain equal. This does not mean that the sum of the energy produced by 5 ten-grain charges would necessarily equal that of a single 50 grain charge. In practice this would not be so unless the pressures generated were the same—and due to burning rates, heat absorption by metallic components of the gun and other factors, small charges often do not produce high enough pressures to secure complete combustion, hence less than the full energy potential is released. Assuming, though, that propellent weight and bullet weight are properly balanced to support complete combustion, the energy released is quite uniform and predictable. Closed-bomb tests verify this.

HALLBERG'S REPLY TO FOREGOING

Dear Major Nonte:

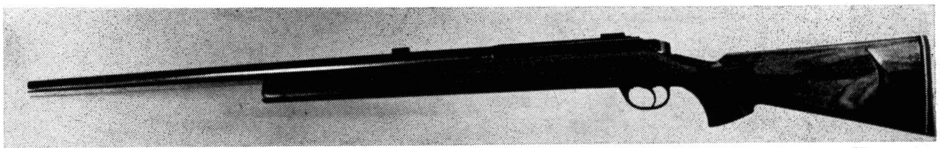
When I sent Observations and Comments to Precision Shooting I did so in the hope that it would stir up some thinking among shooters about commonplace things. Sometimes, it seems, we are too prone to accept without question methods and equipment just because some prominent individual or group says it should be that way. Remember the story about Christopher Columbus and the egg? In his attempt to get a group he was dining with to think independently and originally, he suggested that an egg could be made to stand on end. That started a prolonged debate that he himself settled by cracking an egg on one end and stood it up for all to see.

The .22 Jet cartridge is a fair example of what can happen when advance publicity gets off to an unfortunate start. That cartridge does have too much shoulder relative to the body. If the shoulder had been shortened by an eighth of an inch or so it probably would not have had its tendency to set back against the recoil plate. But that very important problem was not what hurt it marketwise. It was the exaggerated velocity reports on the advance billings that almost killed it before it was born. However, it is noteworthy that it was hurt only in the United States. I understand that in other parts of the world, notably South America, it is very popular and accepted as an important development in handguns. They look upon the Jet revolver as an accurate powerful weapon that uses ammunition sufficiently light in weight to facilitate transportation into difficult areas. The idea behind that cartridge is good even though some of the details of design reflect an unfortunate lack of imagination on the part of the ballistics people who worked on it. Sometimes we can accept a little increased pressure on the head of the cartridge in order to achieve other desirable ends.

The idea of the double taper that we see on the Lebel cartridge might also have been used on the Jet. Such a design might very well appear on some of our cartridges of the future. The French have shown much originality in their ideas concerning things connected with ballistics.

So much for ideas. Let us return to the specific points raised in your letter. Several articles have appeared in Precision Shooting on the question of the short fat cartridge. These articles can readily be referred to by looking back through its pages a couple of years or so. At this time it will be sufficient for me to state that ignition initiated at the base of the bullet of a long narrow case will produce maximum velocity at a minimum pressure. Ignition at the rear of the same case increases pressure and reduces velocity in a relative sense. However, present firearms design requires that the propellent be ignited at the base of the cartridge. I believe (and I have tests to support it) that a short fat cartridge tends to burn the propellent in the chamber rather than passing it into the barrel. The .250-3000 cartridge is good design (on purpose)—the .243 is a good design (by accident).

(Continued on Page Sixteen)



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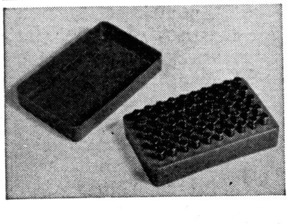

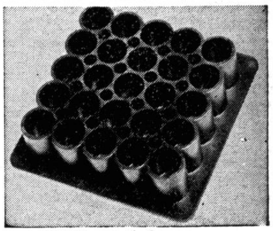

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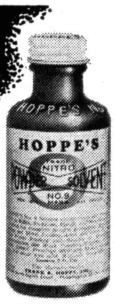

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Bull-Session Stuff

(Continued from Page Fifteen)

It is true that the burning characteristics of compressed gasoline-air mixtures are different than our standard cartridge propellents but the effect of the shape of the chamber from which the gas flows is equally important to both types of charge. That is indicated if you compare results obtained with straight sided and bottle necked cases of similar capacity. Or between bottle necked cases of same capacity but different caliber. Of course bullet design, diameter, and weight must be considered and subtracted from overall effect.

The fact that sharp shouldered cases increase pressures without corresponding increase in velocity has been so thoroughly proved that I can add nothing more to it. I know that factual reports have appeared in the (AMERICAN) RIFLEMAN within the past five years and I believe I recall seeing similar reports in Ordnance Magazine during the Korean era. It is possible you may find indexes to such tests in the larger libraries. If you have liaison with Frankford Arsenal you will find they have made many tests on that problem. The original Nto cartridge had a sharper shoulder (somewhat like the .300 Savage) than the cartridge that was finally adopted. However, in this particular case it was not increased pressure that caused modification—it was rapid feed problems between magazine and chamber. I still have a few hundred cartridges of the original design in my possession. I had hoped the authorities would accept more body taper so as to make the new cartridge more compatible with the use of steel as a cartridge metal. But they turned down that idea and I still think it was a mistake that they did so. Already the price of copper is skyrocketing. Imagine what would happen if we found ourselves in a war!

I appreciate your notes concerning the .348 cartridge. However, I no longer have access to tool room equipment and therefore must leave the metal working job on my cartridge cases to others. This I do not like to do—not only because of cost but also because I like to work my hobby to the limit.

Good luck and good shooting,

Fred W. Hallberg

SUN HEAT EFFECT ON TANK RIFLES

I note with interest Part I of Jesse Griggs' comment on "Barrel Insulation for Sun and Wind."

It brings to mind contact I had some years back with the same subject. I was attending an inspection seminar at APG (Aberdeen Proving Ground) and one of the subjects under discussion was the effect of sunlight (heat) on tank gunnery. It seems that a tank in static position (dug in, defensive), gun pointed generally south, would shoot dead on early, to the right in midmorning, to the right and low by noon, slowly shifting to left by mid or late afternoon, eventually returning to zero after sundown. In short, the gun shot "away from the sun" whenever the tube was exposed long enough for a temperature differential to develop.

Tests had been initiated to determine the extent of this effect on the standard 90mm gun. Tests confirmed field reports. The amount of tube distortion generated by hot summer sun could easily cause an enemy tank to be missed at 1000 yards.

There was obviously no cure for this problem. While the effect had been proven under extreme conditions, a tank gun seldom if ever remains static long enough for it to be serious. Evidently it was determined that no allowance need be made for sun-effect. Tank gunners have enough problems without tossing them a hat full of minor corrections to be made and changed according to the day, hour, temperature, season, gun attitude and God knows what else. Frankly, I feel that decision was the correct one have avoided ever mentioning the effect to sweating, harassed gunners, even in the desert where the effect would be greatest. On occasion, though, I've witnessed misses with the 90mm gun, which I feel could be attributed to the sun-effect.

The only real point I'm trying to make is that the effect is significant and has been proven beyond doubt. Should JMG desire to do so, I believe he could obtain valuable information on this subject from APG—possibly even a copy of the complete test report.

Major George C. Nonte, Jr.

COLT'S NEW TESTING RANGE

"CONSTRUCTION PRODUCTS" for October, 1964, a products periodical of the Armco Steel Corporation, carried an illustrated article on the new rifle testing range at the COLT firearms plant in Hartford, Conn., made necessary for the accuracy testing of the M-16 military rifles that the firm is manufacturing.

The range consists of the shooting house, connected by five 36 inch pipes of ARMCO steel of one-half inch thickness with a target house at 50 yards, and extending on to another target house at 100 yards and 100 meters. The pipes are supported between the houses on H-shape frames.

Test ranges where shooting is done through pipes to tunnels between shooting houses (or rooms) and target houses is not new. Several manufacturers and some individuals have used this general system for a number of years. But the COLT installation does have two features that we believe are NEW, and some advanced ideas in other features.

Each test-firing stand has closed circuit television, displaying a picture of the target on a screen near the test-shooter. Targets are wound on spools for each distance. Targets are advanced when needed, and a photo-electric device automatically steps the target when it is correctly positioned.

"Back-stopping all firing stations, the designers developed over-and-under traps that catch bullets in a stream of water. Bullets hit a 4-inch stream of water directed toward the firing line, ejecting from the narrow end of the steel cone of the upper tank. Bottom tank is equipped with a pump and contains the recirculating water." Spent bullets are caught in a wire screen basket inside the lower tank and are salvaged.

Safety features include a battery of signal lamps beside each firing station which warn the shooters of unsafe conditions, such as faulty flow of water in the bullet trap. If both the shooter and the range master fail to see a warning signal, a loud horn sounds to indicate the shooters are to cease fire.

The access doors to the target houses are guarded by electrically operated interlocks. No one can enter the target area unless the five steel rifle ports at firing stations are closed and locked.

The bullet traps at this range seem to be new and unique, but would probably only be practically applicable for working test ranges, such as this one.

This application of closed circuit television seems to be new. It suggests possibilities of adapting for effective use in promoting the shooting sports as a recreational sport. As both an advertising and promotional project, it would make practical television shows such as are used in promoting other recreational sports, and could make both handgun and rifle target shooting interesting to watch. It could provide spectator attraction for important handgun and rifle competitive events, both on-the-spot and for sport tele-casting. A national telecast of a Wimbledon Cup and/or Leech Cup match final shoot-offs, with target and shooter both shown, with shot-by-shot bullet prints appearing on the target, would get a big audience. Olympic rapid-fire pistol shooting would make an action-packed show that would get a big, interested audience. Even slow-fire rifle and handgun shooting by top-flight shooters would be interesting to watch by a host of people, if both shooter and target could be watched during the shooting. Such programs are possible, are practical, and this writer believes they would be worthwhile. The question is, will someone do something with the idea.

P. H. T.

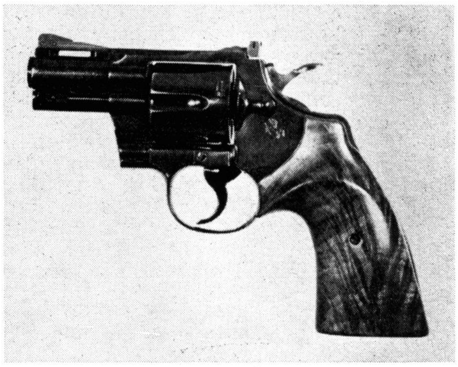
GALLERY RIFLE TOURNAMENT AT MODESTO, CALIFORNIA

The rains stopped to let 93 California shooters travel from near and far to participate in the Modesto January Gallery Rifle Tournament. It was on Saturday, January 9th, that Duane Jenner, of Modesto, posted the winning score of 789. Vic Zimin, of Santa Rosa, was trying to overcome the pace Jenner set by winning the off-hand match with a 192, but lost too many kneeling and came in third with a 783. Fergus Ward, of San Francisco, was trying hard too, and came in second with a 784.

This time the Modesto Rifle Club tried something different for the team match; it was a two-man or Buddy Match instead of the usual four-man team, and were quite pleased with the turnout. Again Jenner posted the high score in this event with 198, and then later his buddy, Harold Ghaner, posted a 194 to set a high score which the other teams couldn't beat.

THE HIGH AGGREGATE SCORES

Duane Jenner, Modesto	789
Fergus Ward, San Francisco	784
Vic Zimin, Santa Rosa	783
Johnny Violini, Gonzales	782
Experts	
Louis Mlcoch, Marysville	777
Ernie Sisco, Modesto	774
Ed Hershkowitz, Butte City	771
Sharpshooters	
Rick Gonzales, Daly City	774
Lloyd Fisher, San Leandro	773
William Mayer, Daly City	769
Marksmen	
Benjamin Tompson, Sacramento	704
Richard Dubbs, Elk Grove	701
Edward Berger, Richmond	698
High Junior, Lloyd Fisher	
High Service, Pat Cavanaugh	



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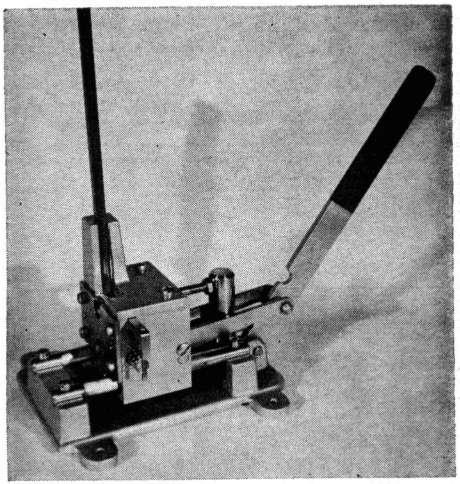

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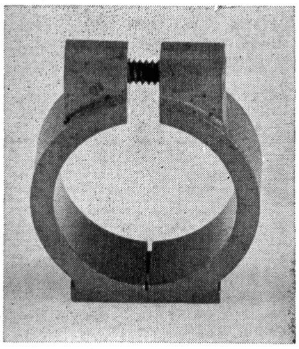

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NORMA Technical Information Bulletin No. 14 and complete loading data for NORMA rifle powders for all the popular cartridges, are available from NORMA-PRECISION, South Lansing, New York.

The bulletin contains information on the complete line of Norma rifle powders, including the latest addition, No. 205.

Norma 205 is formulated expressly for the handloader who wants top velocities with magnum loads. Its ultra-slow-burning, high-energy properties generate the highest MV's, while at the same time retaining breech pressures well within safe limits with maximum recommended loads.

For example, a 7X61 S&H case with 160 grain bullet and 64 grains of Norma 205 develops an MV of 3100 fps, with breech pressure of 49,000 psi. A .308 Norma Magnum case with 180 grains bullet and 76.7 grains of Norma 205 reads out at 3173 fps and 51,600 psi. These are maximum recommended loads which conform closely to factory loads.

P. H. T.

STATE ASSOCIATION PUBLICATIONS

The New York State Rifle and Pistol Association publishes quarterly an information packed **printed** news bulletin for its members, titled "The BULLET." The Association, with an individual membership of 2,818, sponsors a complete program of rifle and handgun State Championships. It is very active in the firearms legislation field and in 1964 had a leading part in softening some of the most irritating features of New York's notorious Sullivan Law. Marion Volk, 600 Oakdale Road, Johnson City, New York, is the Association Secretary.

The Illinois State Rifle Association is another that publishes a quarterly **printed** bulletin for its members, which is really a small magazine, the Fall issue having 30 odd pages. It is titled "ILLINOIS SHOOTER" and the editorial office is at 22730 Sherman Road, Chicago Heights, Illinois 60411. The Illinois Association is active in the firearms legislation field, and in the past has put a lot of effort and considerable money into successfully defending some of its members from unjust treatment incurred by local laws. The Association also sponsors a complete program of State Championship matches.

The Wisconsin Rifle and Pistol Association, Secretary, Martin A. Kjelson, 451 Audubond Road, Kohler, Wis., publishes a quarterly mimeographed bulletin for its members, titled "THE CLEANING PATCH," which keeps its membership quite fully informed of Association activities.

The Connecticut Rifle and Revolver Association's monthly news bulletin, THE CONNECTICUT MARKSMAN," is probably the oldest continuously published association news bulletin in the nation. This association and its members is noted for Yankee independence and has more than once turned thumbs-down on NRA policy that it did not agree with, but nevertheless is a constant and strong NRA supporter. Connecticut is in the heart of a populous area of shooters and has a very broad shooting activity program. It also has quite a successful record in the firearms legislation field.

The Washington State Rifle Association publishes a monthly, mimeographed news bulletin which is packed with news and information for its members.

No doubt other State Associations publish periodical news bulletins, which we do not know about. Such publications are valuable for keeping membership informed and, usually, are an aid in building and holding membership.

P. H. T.

RANGE FINDER

A pocket-size range finder is manufactured by the VEXILAR ENGINEERING COMPANY, Box 6286, Minneapolis 24, Minnesota. This little instrument is based on the same principle, but reversed, that governs Stadia surveying.

In Stadia surveying, distance is read directly on a graduated target rod, the reading being that contained between the "stadia wires" in the transit telescope. With this little Vexilar Range-Finder, the target is a 6 foot rod or comparable object (man's height, for example), and the distance between range finder and target is read directly on a graduated scale scribed on the lens of the range finder. If the target is a vertically held rod exactly 6 feet long, the distance reading should be quite accurate. If the target is an estimated 6 feet tall object, the distance reading will be only approximate, the accuracy being comparable to that of the estimated height of the target.

The range finder is said to be accurate for distances from 40 to 500 feet. The 500 feet distance limit is probably due to that being the longest distance to the 6 feet high object (target) can be seen with reasonable clearness. The little instrument might be useful and convenient for finding distances over rough terrain, across streams or over other obstructions. Its price is $2.98, so one wouldn't be stuck too badly if it shouldn't be as good as it promises.

P. H. T.

TRADIN' POST

Classified type ads; no display. **Rates:** — 10¢ per word per insertion, prepaid. Minimum charge $1.00. Closing date for ads is the last Saturday of the month preceding publication.

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SELL OR TRADE new 52D heavy barrel. Want new or perfect 40-X .308. Clyde Speight, 822 Ridge Blvd., Connellsville, Pa. 15425.

FOR SALE: Winchester M70 .300 H&H bull gun, unaltered, accurate, $130, Mauser VZ 24 Douglas barrel, Jaeger trigger, 13 lbs., 22/250, ½" groups, $95. BSA Mk 111 International heavy barrel, $130. All near new and accurate. B. Johnston, 2912 Giles St., West Des Moines, Iowa.

WILL TRADE EVEN 2 inch Unertl, 20 power, perfect condition, for Lyman 20 power with recoil spring. Ray Geitner, 628 So. St. Marys Street, St. Marys, Pennsylvania.

WELCOME NEWS FROM WINCHESTER

Winchester-Western Division of Olin Mathieson Chemical Corporation has just announced that it will now sell Model 70 barreled actions.

The Model 70 barreled actions are produced without sights or sight blocks. The receivers are drilled, tapped and filled with removable plugs.

The barreled actions are available in the following styles, calibers and suggested list prices—Standard: 225 Win., .243 Win., 270 Win., 308 Win., and 30-06 Springfield ($115.25). Magnum: 264 Win. Mag., 300 Win. Mag., 7mm Rem. Mag. (available after June 1, 1965), and 338 Win. Mag. ($126.50). Varmint: 225 Win. and 243 Win. ($126.50). Target: 30-06 Springfield ($160.35).

(This has been a long time coming. We now wonder if Remington may follow suit with Model 700 barreled actions. Savage led the way by making its bolt action Model 110 barreled actions available soon after the rifle was in production, and even actions alone to gunsmiths, only. PHT)

BB CAPS

By Fred W. Hallberg

A friend who was preparing to move out of town discovered a packet of ammunition that had apparently laid hidden in a closet for the past fifteen years or so. As quite often happens, the packet was sent over to me with instructions that I get rid of it—in other words, burn it up. It included several different calibers in unopened boxes ranging from .30/30 to .22 caliber BB Caps.

The BB Caps proved most interesting. It had been a long time since I had fired such ammunition—perhaps fifty years or so when, as a youngster, I had used them in my Hamilton, Flobert and Stevens rifles. In those days, when I finally reached the point where I could pay seven dollars for a Stevens Favorite or twelve dollars for a Stevens Visible Loader, I really thought I had everything.

But in this day of wax bullets and other loads reduced to the extremes of mildness, the BB Caps seemed to reopen possibilities that had never before occurred to me. These BB Caps represented different makes. All except one brand seemed to have deteriorated. But that good brand was really good. They were packaged in yellow Peters boxes and were identified with number 112. In fact the quality of these particular BB's exceeded anything I had ever thought possible in such a cartridge.

I tested them on our 50 foot gallery range in a Hi-Standard Olympic model pistol with a six inch barrel chambered for the .22 short. That pistol was chosen because I assumed the twist in the barrel would be slower than in other pistols chambered for the .22 long rifle. Of course, it had to be fired single shot. Accuracy when fired by myself, and also when fired by several other shooters who were at that time on the firing line, seemed to be every bit as good as that of two different brands of regular .22 short cartridges. Velocity of the BB was not as great as the regular short and therefore you had to hold steadier, but aside from that one shortcoming I would say that this was a cartridge that should be resurrected for basement practice in the home.

Europeans, years ago, often entertained guests with marksmanship games by using such cartridges in their homes. They were used in parlors or hallways much as you would use such places for other means of entertainment. Firing was done with specially constructed miniature rifles into bullet traps that were somewhat similar to, but larger, than the traps we now use in this country.

Another intriguing feature of these Peters cartridges was the fact that the bullet imprinted the target like a wadcutter. Instead of presenting the ragged holes common to all our .22 caliber rimfire cartridges, the holes made by these BB's were cleanly cut. I don't know whether the bullets were designed that way or whether the construction was accidental, because examination showed that the wadcutting quality was apparently due to the blow of the bullet seating machine. Of course, this is only a guess based upon the appearance of a knurled crimp-like shoulder pressed into the bullet. Now, why can't we have such wadcutting .22 long rifle cartridges especially designed for handgun target shooting? I think it can be done. But then, no one will let me work in their ammunition factories. (Editor's note: It seems to me that I hazily recollect that .22 long rifle cartridges with such "clean-cutting" bullets were made and marketed by Remington for a short time in the 1930's, and I believe that I used some of them at the time. They apparently were not popular and were rather soon discontinued.)

In looking about locally for a current supply of BB Caps, the only brand I could find was a foreign one made in Italy. They were immediately rejected because accuracy, as such, was non-existent. I then tried some CB Caps (conical bullets) of the same brand. These were much superior to their BB Caps but they still fell far short of the old Peters cartridges. Groups made by the Italian CB's were at least a third larger than those produced by the Peters BB's. I understand a German brand is also imported into this country but they are not available locally.

To sum up, I believe a market could be created in this country for a high grade domestic wad-cutting .22 BB or CB cartridge. Cost would be slightly less than that of our .22 shorts, but not very much so. Nevertheless, these miniature cartridges would be in demand because low noise and low power factors would make them readily adaptable for use within the average home.

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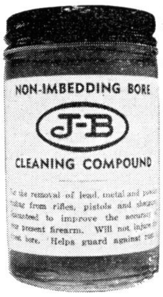

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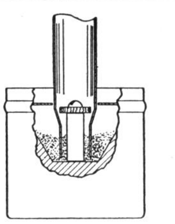

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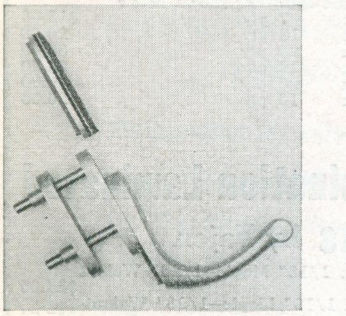

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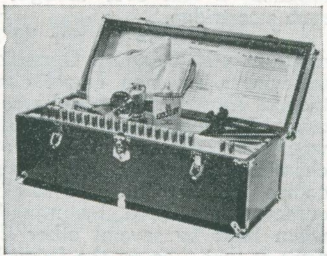

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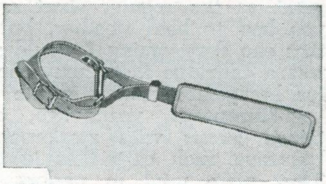

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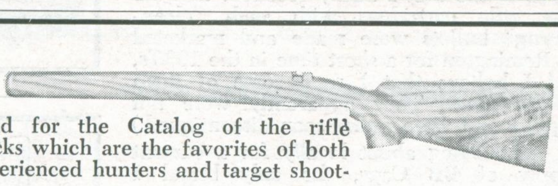

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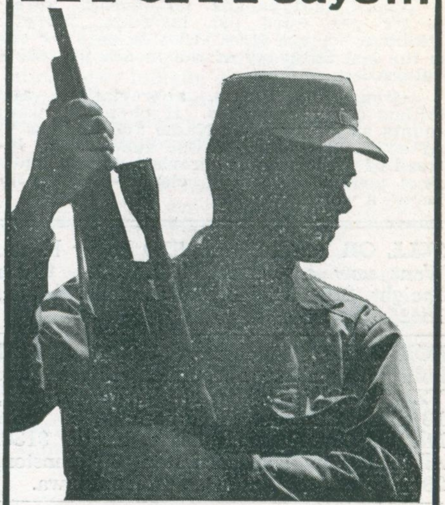

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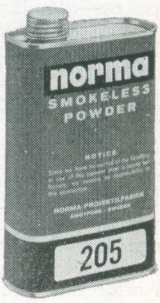

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